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ABSTRACT

The papers in this collection represent a wide spectrum of approaches, philosophies, viewpoints, and techniques of scholarly endeavor in their treatment of the reading process. The 55 papers, which were presented at the 1978 meeting of the National Reading Conference, are arranged according to the following categories: (1) reading readiness, (2) the word level processing of children, (3) the word level processing of adults, (4) comprehension, (5) remedial issues relating to children, (6) remedial issues relating to adults, (7) college reading, (8) instructional issues, (9) teacher training, (10) affective issues, (11) research methodology, and (12) linguistic awareness. Two addresses by the president of the organization are also included in the collection. (FL)

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READING RESEARCH: STUDIES AND APPLICATIONS

Twenty-Eighth Yearbook
of
The National Reading Conference

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TABLE OF CONTENTS

Page

PRESIDENTIAL ADDRESSES

Beyond Criterion-Referenced Measurement 1
J. Jaap Tuinman

An instructional Perspective on Basic Research in Reading 9
J. Jaap Tuinman

READING READINESS

Development of Kindergarten Children's Understanding of Concepts About Print and Oral Language 19
Kaaren C. Day and H. D. Day

An Analysis of Current Research on the Metropolitan Readiness Test and First-Grade Reading Achievement 23
M. Jean Greenlaw and David Moore

WORD LEVEL PROCESSING: CHILDREN

Effects of Instruction Type on Word Prediction Behaviors 29
Richard Allington and Susan Chura

Methodological Considerations and Developmental Trends in Children's Awareness of Word Boundaries 33
Irene H. Blum, Nancy E. Taylor, and Robert A. Blum

A Comparison of Context Usage by Good and Poor Readers in Word Boundary Tasks 39
Mark W. F. Condon and James V. Hoffman

The Differential Role of Function Words and Lexical Items in Narrative and Expository Text 45
Margaret Smith-Burke and Patricia S. Gingrich

Semantic Salience in Relation to Word Knownness 49
Elizabeth Sulzby

Beginning Readers' Recognition of Taught Words in Various Contextual Settings 55
Martha Wood and Mavis Brown

WORD LEVEL PROCESSING: ADULTS

Meaning Assignment Strategies of Skilled Adult Readers 62
Judith A. Boettcher

Differential Relationships of Two Versions of Cloze Tests to Vocabulary and Reading Comprehension 68
Eileen B. Entin and George R. Klare

Words and Contexts 72
Philip B. Gough, Jack A. Alford, Jr., and Pamela Holley-Wilcox

College Students' Word Identification Strategies 76
Mary McMurray, Ray Morgan, and James Laffey

COMPREHENSION

Text Type and Children's Recall 82
Carol N. Dixon

Verbalization of Schemata Over Time: Investigation of Changes for Fifth Graders and Adults 86
Ruth Garner

Critical Picture Comprehension Skills and the Child's Sense of Story 91
Karla Hawkins Wendelin

The Effects of Sentence Expansion Practice on the Reading Comprehension and Writing Ability of Third-Graders 95
Victor Froese and Susan Kurushima

Cloze Procedure as a Comprehension Measure in Grade Two 100
Pose Lamb

Children's Comprehension of Pictorial and Textual Event Sequences 104
Mary Beth Marr

Organizational Patterns in Prose and Their Use in Reading 109
Bonnie J. F. Meyer

Etiology of Reading Comprehension Style 118
Rand J. Spiro

Children's and Adults' Recall of General Concepts and Details after Reading 123
Barbara M. Taylor

The Functions of Inferences: An Extended Examination of Discourse Comprehension 129
Robert J. Tierney and Connie A. Bridge

Truth Meaning Versus Referential Meaning in Adults' Reading Comprehension 134
Sean A. Walmsley and Peter Mosenthal

REMEDIAL ISSUES: CHILDREN

Some Differences Between Good and Poor Readers 140
Marilyn Jager Adams

Clinical Reading Practices: Some Legal Considerations 145
Dr. Joseph A. Muia and Dr. Eugene T. Connors

Early Prediction of Reading Success: Profiles of Good and Poor Readers 150
Robert B. Ruddell

REMEDIAL ISSUES: ADULTS

A Resource for Adult Illiterates: Mail-Order Catalogs 159
Evelyn B. Spache

The Accuracy of Adult Disabled Readers' Perceptions of Their Own Reading Difficulties 161
Ellen M. West and Diana L. Lagotic

COLLEGE READING

Reading Ability, College Grades, and Attrition: A Two-Year Study 163
Lynna Geis and Myrna L. Carney

The Effects of Imagery on Word Perception and Comprehension of College Readers 168
Josephine Spivack Goldsmith and Cynthia Van Norden Peck

A Comparison of Small Group and Individualized Instruction in Junior College Remedial Reading Programs 174
Ruth Justine Kurth

Notetaking vs. Notehaving: A Comparison While Studying From Text 177
Vincent P. Orlando

An Evaluation of the Effectiveness of a College Reading Program Using Four Criteria 182
Nancy K. Staley and Thomas J. C.-Smyth

INSTRUCTIONAL ISSUES

Symbolic Communication Interface for the Multiply-Handicapped 186
Ron C. Leslie and N. A. Peters

A Consideration of Hierarchies for Reading Instruction 191
Jana M. Mason

Effects of Instructional Emphasis and Pupil Engaged Time Reading Achievement 199
William H. Rupley and James F. McNamara

The Commonest Syllables 204
Elizabeth Sakiey

Bridging Theory and Practice: An Instructional System in Reading/Language Arts (K-8) 210
Judith D. Smith

TEACHING TRAINING

The Development of An Instrument to Measure Teacher Beliefs About Reading 218
Gerald G. Duffy and William Metheny

Combining University and School-Based Inservice Education in Content Area Reading 223
Mary M. Dupuis and Eunice N. Askov

Interactive Model of Teacher Education 228
Lenore H. Ringler, M. Trika Smith-Burke and Ruth S. Meyers

Reading Inservice Needs Assessment: Instrumentation and Analysis 236
Catherine C. Tolsma and Robert D. Chester

AFFECTIVE ISSUES

Male and Female College-Age Readers' Affective Response to Formal, Colloquial, and Substandard Dialogue of Male and Female Literary Characters 246
M. Jane Greenewald and Ken L. Dulin

Elementary Readers' Inferences of and Preferences for Characteristics of Protagonists in Stories 249
Terry Lovelace

The Relationship Between Teacher-Student Interaction and Students' Reading Comprehension 239
Margaret W. Cohen and Peter Mosenthal

Attitudes Towards Reading and Learning From Text 254
Harry Singer

RESEARCH METHODOLOGY

The Application of Signal Detection Theory to Reading 261
Michael F. Graves and David W. Furniss

Rate of Comprehension Flexibility — A New Measurement Procedure 266
Earl F. Rankin

LINGUISTIC AWARENESS

The Psycholinguistic Basis of Linguistic Awareness 274
Ignatius G. Mattingly

The Psycholinguistic Basis of Cognitive Clarity 279
John Downing

The Syntagmatic-Paradigmatic Shift Word Associations and Learning to Read 284
Albert J. Kingston

Phonological Coding in Beginning Reading 289
Carol A. Fowler

Discussion: Linguistic Awareness and Cognitive Clarity in Learning to Read 295
Albert J. Harris

Papers Presented at the 1978 Meeting of the National Reading Conference 297

FOREWORD

The 55 papers in this volume share a common characteristic. They are excellent examples of studies of the complexities of the reading process. They do, however, represent a wide spectrum of approaches, philosophies, viewpoints, and techniques of scholarly endeavor. That reading research is a vital, exciting, interdisciplinary field of inquiry is fully supported by the excellence and diversity of this volume.

The efforts of many individuals have made our task possible. We extend particular thanks to the members of the Editorial Advisory Board. They diligently read and commented upon manuscripts and assisted us in making difficult decisions.

Carol Davis and Tim Rush served us well as editorial assistants. They spent countless hours reading manuscripts, checking punctuation, verifying references and the like.

Linda Gauthier deserves special appreciation for keeping us well organized. She filled in wherever necessary. Besides, she maintained the files.

The individual authors, of course, deserve a full measure of credit. Without their efforts there would be no *Yearbook*.

We have found our task to be arduous, but rewarding. We hope the readers will also find the contents rewarding. Since we began our editorial tasks, we have encountered many questions about reading. This volume provides some of the answers. Hopefully it will be an impetus for more.

Michael L. Kamil
Alden J. Moe

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Simon Fraser University

BEYOND CRITERION-REFERENCED MEASUREMENT

Presidential Address presented at The Annual Meeting of The National Reading Conference, St. Petersburg, Florida, November 1978.

The other night, traveling from here [St. Petersburg] to Orlando I passed a sign announcing a religious event. In bold neon letters the sign read:

REVIVAL — Reverend Harry Dull

You laugh and I of course anticipated that. The concepts of dullness and revival are incongruous; their being contrasted, presumably unintentional, we find amusing. As language users we have no difficulty identifying and "explaining" this and similar linguistic accidents. As psychologists of language, however, we are yet less accomplished. Are our theories of language, of implication, of behavior, both general and specific enough so that we can build a machine that would chuckle when presented with this neon sign? I doubt it. And, I'm sure, our colleagues in artificial intelligence would be equally skeptical. Nevertheless, real progress in the measurement of reading skills depends intimately on the further development of an adequate psychology of language. My remarks this morning should be interpreted with this proviso in mind.

This is the year Oscar Buros died. Those interested in the content of educational tests lost a friend. Throughout his career Buros emphasized that no amount of statistical manipulation can remedy the weakness of a poorly conceptualized test. His vigilance against uncritical acceptance of psychometric evidence as proof of the quality and usefulness of educational tests I believe unmatched.[1]

Educational tests, reading tests not excepted, suffer far more from meager mathematical justification. This is an old complaint. In her classical article on item analysis Marion Richardson noted even in 1936:

> "The present writer is of the opinion that the ingenuity displayed in the invention of new indices has outstripped the critical examination of the logical foundation for item analysis." (Richardson, 1936, p. 395)

Forty years later, in an insightful review of key developments in educational measurement in this decade Lumsden (1976) addresses the same issue from a slightly different perspective when he calls for a new kind of test theorist:

> "They will not test a new model with a few items from the SAT files (or from a computer), find a mediocre fit to some dubiously relevant criterion and then to on to the next. Rather, they will set out the requirements, testing the model against a user-for-blood standard of efficiency. They will not seek salvation in the epicene elegance of elevated algebra but will prefer vulgar analogies" (p. 277).

Buros, Richardson, and Lumsden make an identical point which cannot be overemphasized. If educational measurement is in an impasse, and measurement of reading skills *is*, the problem is not with the algebra, but with the thought behind it.

Some four years ago I introduced an analogy to illustrate some basic conceptual problems facing criterion referenced measurement (Tuinman, 1978). Briefly, the story goes as follows:

"Once upon a time, in the chilly, icy, most southern regions of the globe, a tribe of Penguins decided upon an extensive self-improvement program. A committee of new experts in the art of self-improvement met and decided on the goal of the first Federally Funded SI Program. 'We must,' they said, 'learn to fly.' After reading a book by a learned Penguin named Pipham, the committee realized that their global goal needed to be broken down into narrower objectives. 'Let's make them behavioral,'' a farsighted Penguin suggested. 'That way we will have fewer measurement problems and less uncertainty about the success of our training programs.'

"Quickly it became evident that, in order to succeed in formulating adequate objectives, the behavior 'flying' needed to be observed first hand. So a subcommittee was commissioned to trek north and observe flying animals in different situations.

"One member of the committee made a special study of seagulls. He noted that every time just before these birds soared into the air, they dipped their heads under water. Dutifully he made note of this very important characteristic.

"One of his colleagues reported that the birds he observed would peck into the ground and extract a worm just before taking off. The committee decided that the two behaviors showed a great deal of similarity and that, no doubt, both contributed to the mechanics of taking off.

"During a month of study, many more analyses were made of the art of flying. The discovery which pleased the committee most, however, occurred when they inadvertently stumbled upon Dallas Airbase and observed the take-off of truly big and heavy birds. 'We must analyze their behavior very closely,' they told themselves. 'Those are the only birds bigger than us.' Thus, they added to their list of objectives:

01. 'The student must be able to run at great speed in a straight line before taking off.'

02. 'The student must be able to produce a loud whirring sound from deep inside his/her chest before starting the take-off run.'

Satisfied, the Subcommittee on Objectives returned to Penguin Land.

"Soon a training program was implemented and criterion referenced measures from each objective were built and validated.

"After three months, the first student (a smart Penguin cookie as ever there was) had completed all training modules and passed all criterion referenced tests. She was ready to fly. The Committee on Self-Improvement came out in full force to observe and celebrate the event.

"The student's whirring sounded beautiful, her pecking at the hard ice was rhythmic and smooth, her running down the take-off strip an awesome display of athletic prowess. Alas, she never took to the air, and after a full day of frenzied flying was finally committed to a hospital to recoup from a nervous breakdown."

At that time, my interpretation focused foremost on the license to build tests endlessly suggested by the task analysis performed by the birds. Now, I'd like to emphasize the non-theoretical nature of this type of task analysis as at least a partial cause of the birds' unjustified optimism. Parenthetically, I should also point out that I am now far less sanguine about the prospect of constructing meaningful and useful learning hierarchies of reading skills than I was when I wrote the story. In general, it appears to me that criterion referenced measurement in reading has made little or no progress after the initial application of CRM thought to our area of curriculum specialization.

Today I want to specifically emphasize three points in discussing the measurement of reading achievement:

a) Norm referenced measurement needs shoring and re-interpretation, but it is here to stay.
b) Technical problems with criterion-referenced measurement will be resolved only if and when certain conceptual ones are dealt with first.
c) Our focus should be on educational measurement rather than on educational tests.

Let me be blunt and state that I consider norm-referenced measurement both unavoidable and desirable.

The human need to integrate, to interpret information to the largest possible unit is illustrated in our sphere by at least two measurement "events." First, after the initial reading assessment, NAEP actively sought the cooperation of the IRA to establish an interpretation panel, to "make sense" out of the data. In fact, the scores on each of the criterion items are fairly unambiguous. Problematic is the relationship of all these separate pieces of information to some less atomistic unit. Second, consider the recent spate of papers on the RMC models presented at the 1978 AERA meeting. (Fishbein, 1978; Linn 1978; Barnes and Ginsburg, 1978; Rutherford, 1978). As a group these papers present the spectacle of statisticians scurrying to retrieve meaning. In this case the move is not only toward larger units of interpretation but as well toward an undisguised reinterpretation of CRM data in NRM terms.

The human need to compare is so dominant that, I fear, no amount of psuedo-philosophical theorizing about this form of measurement in education is going to thwart its expression. In many contexts the value of the achievement is in the comparison.

When the 1978 Nobel prize for Peace was awarded to Mr. Begin as well as to Mr. Sadat, Time Magazine writers made an explicit comment on the fact that the prize lost in meaning for Sadat *because* Begin also was included. In sharing the achievement dulls. The single book which may represent a towering achievement in one faculty will be of far less merit in another faster-publishing group of academicians. The four minute mile long was the target of many a runner. Many may have thought of it as an absolute criterion. However, when Bannister broke the magic limit his performance was important only because no one else had done so. There is no doubt in these and many other instances that the value of an achievement is determined and determinable by comparison.

In practice the fine tuning of criterion-referenced tests in fact leads to a kind of hidden norm-referencing. When, as is customary, items are tried out, their retention in or rejection from the final test often depends on how difficult they are for the students in the pilot study. The performance of a new group of students, therefore, depends in large measure, on the level of skill of the students in the initial pilot. The statement "The new students scored at

14

mastery level" needs to be complemented "on a criterion suitable for students of X level of skill." Criterion-referenced measurement of reading skills than becomes in effect indirectly norm-referenced. Johnny only is a master when compared to thirty specific other Johnnies. Given thirty Sams, of higher ability, in the pilot, Johnny might not have been able to reach mastery level.

Finally, reading tests involve the interaction of mental operations and linguistic elements. The trouble is that the operations, themselves varied and complex, are performed on essentially an infinite number of combinations of an extremely extensive set of linguistic elements. The ability "to draw casual inferences" can be tested in such a variety of syntactic, lexical, semantic and pragmatic contexts that it becomes virtually impossible to specify meaningful, non trivial item writing rules which operationally define criterion behavior. (I recognize the work of Bormuth (1970) and others but I have, among others, serious reservations about the practical contribution of that kind of suggestions (Tuinman, 1970, 1978).) The best the writer of criterion-referenced measures can hope for is a universe firmly defined by a specific curriculum, textbook, story, etc. from which to sample. The application of CRM is more generally defined contexts is severely limited, however, in plain language: There just are too many loose ends regarding the texts to test on; the information in these texts to focus on; the question to ask; the way to ask the questions. None of these issues are terribly problematic in a theory of norm-referenced measurement. In CRM, however, they represent severe problems in terms of identifying criterion behaviors and in terms of selecting intrinsically definable scores.

We might benefit from a change in terminology. "Norm-referencing" has connotations which are unhelpful. Typically, norm-referenced tests assume that the ability of achievement measured is normally distributed in the population. Hence, tests are constructed in order to show normal distribution. I need not argue here that this assumption may have little merit for the measurement of at least some aspects of reading achievement. (See also, Lumsden's (1976) argument against assuming any "underlying" or "true" ability.) Comparison of one individual's performance to that of an appropriate norm group is possible even if the tests used do not assume or force normal distributions. We need comparative interpretation tests based on meaningful performance curves. I view such curves as *de facto* descriptions of the performance of appropriate norm groups. Their construction requires a pulling-up-by-the-bootstrap-procedure, initiated by the use of naive items (i.e. *not* preselected on an assumed mathematical model). In addition to being naive, these items must be *realistic*. That is, they must be derived from descriptions of actual usage of information. Comprehension questions, for instance, should stem from analysis of the internal question asking process the reader engages in as he reads. Taxonomies are fine for defining the range of intellectual operations to be engaged in; they say little about their frequency and context. As such they form an inadequate basis for measurement.

Comprative interpretation tests require the establishment of meaningful reference groups. Age and sex in many instances are only of apparent interest because they are traditional. How well does Johnny read compared to other science students, compared to middle level bureaucrats? The use of such comparison groups assumes resolution of the difference between using the average engineer and the engineer's average as a norm.

Comparative interpretation tests, under ideal circumstances define performance both in terms of a what's read and who else is reading it; Y reads X-material as well as Z-persons.

The problematic nature of CRM is illustrated in much of the current work on technical concerns. Illustrative is a recent paper by Berk (1978).

Specifying a 95 percent confidence interval he is able to show that one needs 58 items to test the comprehension of a population of 1000 sentences if one uses 80 percent mastery as the criterion score. This sounds very precise and helpful until one realizes that Berk's calculations are based upon Bormuth's unproductive conceptualization of the measurement of comprehension (Bormuth, 1970; Mehrens, 1970; Tuinman, 1970).

That the development of new indices does not necessarily even reflect progress on the technical side is demonstrated by Downing and Mehrens (1978). When these authors compared six single-administration reliability coefficients for CRT's, they found only one measured test characteristic that differed from the classical Kuder-Richardson formula's. (This study did not include Brennan and Kane's (1977) index. However, see Lumsden (1976) for a critical evaluation of the signal/noise ratio concept.) More disturbingly, when Smith (1978) compared five popular item selection methods he found that none of the methods was consistently superior. Indeed, random selection of items worked just about as well as any other method.

The general point that the elaboration of mathematical techniques can obscure basic conceptual problems is yet more clearly demonstrated when one reviews recent work on establishing adequate criterion, mastery or pass scores. The intent, of course, is to formulate techniques which will validly classify individuals as masters or non-masters. Two of the more interesting papers by Huynh (1977) and Faggen (1978) illustrate current attempts to deal with the issue and their inadequacy.

The procedures for establishing mastery scores are elegant and appear effective. Nevertheless, both papers share a very fundamental problem. Whether or not a student is validly classified as a master on test i is judged by his/her performance on test j. Presumably, test j is more complex, more general or higher in some skills hierarchy than test i. I grant that adequate tests of accuracy of classification are needed. The bulk of the unresolved issues, however, relate precisely to the specification of the relationship between tests i and j and to the adequacy of test j as a criterion. This is far from an issue for idle contemplation. It raises its head in very reading management system currently in use. Test constructors are saved by the fact that most tests, whatever their label, format and content, load heavily on a general verbal factor. Were it not for that fact, teachers would be confronted with many more puzzling patterns of performance on series of tests in their "management" batteries than they already face.

Seldom are relationships among tests made explicit. Implicitly, however, hierarchical connections and transfer of skills acquired to other more complex ones are routinely assumed. Criterion-referenced comprehension tests fail, however, precisely because either they can't satisfy these assumptions or, in the event they do, there are precious few ways to empirically demonstrate this.

An early optimism about the possibility of isolating and describing learning hierarchies is now tempered by the realization that even in the case of simple behaviors, empirical verification of hierarchical relationships is difficult. Two recent papers demonstrate the paucity of effective techniques. Guay and McCabe (1978) point out serious shortcomings in existing tests of hierarchical dependency. They then present a test which they claim remedies these problems. However, being restricted to a pair-wise comparison of skills their test too is very limited in scope. The state of the art is best illustrated by Griffith and Cornish (1978). They extend White and Clark's Test of Inclusion to more than three items per skill. The relationships among 7 skills, representing the development of an introductory chemistry concept, were than analyzed. In all, some 10 possible hierarchies result from the analysis. Hardly a comforting thought, considering the relatively simple nature of the skills involved. The prospect of extracting ourselves from the measurement muddle through specifying skills hierarchies in the comprehension domain is dim indeed.

Even if more powerful statistical techniques were available and practical, there is still grave doubt regarding the applicability of the hierarchy concept to the comprehension domain. Every teacher knows that it is possible to ask a very easy "higher order" question and a very difficult "lower order" question. If skills hierarchies are to be studied at all, this should be done within a given level of language, within a defined lexicon. We will never understand the contribution of "being able to use content" to "being able to draw inferences" unless we first systematically study the relationships among such skills for a particular set of words, specific syntactic patterns, and a specific semantic and pragmatic context.

No doubt CRT's find their justification in their potential utility for making instructional decisions. Yet, in practice, teachers as often as not find current CRT's unhelpful or confusing. The relationship between specific lower level tests and more global achievement is often tenuous and counterintuitive. The problem lies only in part in inadequate validation of learning hierarchies. Another shortcoming of CRT's of the type currently in vogue, however, is their exclusive focus on product at the neglect of attention to process.

Cognitive psychology emphasizes an orientation towards the learner who monitors his cognitive processes according to task demands. In comprehension the emphasis on active processing is illustrated in the work of Wittrock and his associates (e.g. Doctorow *et al.*). Formally, Greeno (1976) proposes a reconceptualization of learning objectives, underlying CRM, in terms of outcomes and cognitive process analysis. Instructional measurement must be reevaluated in terms of the cognitive demands of both criterion tasks and enabling skills. Such a reevaluation is a condition *sine qua non* for progress in the development of instructionally useful criterion-referenced measurement.

Considerations of validity and reliability are typically limited to a test *per se*. Yet, tests differ widely in their potential for misuse and in their robustness against misinterpretations. In the end, in instructional contexts, most tests are used to assign pupils to a limited number of nominal or ordinal categories. I would like to see our definitions of reliability and validity to include that final step in the measurement process. Hence, for instance, a reliable test is one which results in a user consistently making the same instructional decisions; or alternately, a test which leads different users, given a set of prescribed instructional options, to make comparable instructional decisions. Whether or not this proposal is too radical or too cumbersome, I believe that we sorely need studies of the relative amount of variance due to users and due to tests in situations where tests purportedly form the basis for instructional decisions.

There is no use for a ruler which permits measurement to the millimeter when there is no one who can hold it without a tremor.

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[1] I permit myself a personal anecdote to illustrate this. After reading the first draft of my review of the Woodcock Reading Marking Tests for the Eighth MMY, Dr. Buros commented that he liked my emphasis on item content but lamented my rather unquestioning acceptance of the elaborate and unique statistical apparatus accompanying the test. The subsequent revision of my manuscript incorporated many of his incisive critical comments. I assume that, in this way, Buros exerted a healthy influence on test reviews, and test reviewers, throughout his career as MMY editor.

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AN INSTRUCTIONAL PERSPECTIVE ON BASIC RESEARCH IN READING

Presidential Address presented at the Annual Meeting of The National Reading Conference, New Orleans, November 1977.

My major contention today is that reading researchers do not spend enough time in the schools and classrooms when reading is taught and learned. More generally, reading researchers have too little contact with the reader as he learns and reads.

I shall analyze some of the reasons why this is so and speculate on the consequences.

A survey of the research report in such journals as the *Journal of Reading Behavior*, the *Reading Research Quarterly*, the *Journal of Verbal Learning and Verbal Behavior* reveals that (a) the main reason for researchers to be with readers is to collect data from them and (b) this data collection process is often very brief. It is not unusual for a reading researcher to collect all the necessary data for a study in 3 to 5 hours.

The fact that reading researchers are in contact with readers only at the moment of data collection is far from trivial. The history of science is filled with accidental discoveries and insights. Quite likely it is superfluous to refer to Galvani's discovery of the principle of the electric battery after he watched a frog's leg twitch and to Minkowski's discovery that urine contained sugar (an important discovery for medical help of diabetics) when he was operating on his dog. I believe that the *modus operandi* of many reading researchers minimizes the opportunities for such chance discoveries.

Reading researchers have no laboratory or they behave as if they don't. The *a priori* specification of the kinds of data to be collected, the quick in and out data hunting forays into the classroom minimize the opportunity for the fortuitous accident and, more importantly, for the creative generation of valuable hypotheses.

The classroom, the reading corner, the library are the reading researchers' laboratory. Most of these stay vacant.

A scientist must develop a sense of his phenomena and a feel for his data. The latter aspect is stressed frequently by means of such exhortations as: "plot your data before you try to interpret your correlations, etc." Little emphasis is given, in contrast, to opportunities to develop a sense of the aspect of reading studied other than in the forms of scores, data. Yet, such sensitivity is essential. As Flesch (1951) points out Roentgen discovered X-rays by accident when he noted that cathode rays penetrated black paper only because he was Roentgen, sensitive to the data coming his way which others might have thought meaningless. There is nothing mystical about this kind of insight. More often than not it presupposes intimate experience with the phenomena under study.

Our experimental designs and even more our research traditions do not encourage long term study of children's reading in actual learning situations. In this respect the North American researchers tend to differ from their West European and Russian colleagues. I refer to the work of Peter and Else Petersen (1965) and to the studies of Gal'perin (1972).

Part of our problem is an all-consuming pre-occupation with outcomes of the learning process rather than with the structure of the process. I suspect that if the development of psychometrics during the last 75 years (and particularly during the first half of the period) had been less rapid, the study of both the reading process and the teaching of reading would have taken a quite different turn.

The Dutch educational psychologist Van Parreren (1970) maintains that psychologists and educators (he uses the term didaxologist, one studying and learning and teaching) take a different view of learning. The psychologist normally limits himself to the study of variables affecting the learning outcome. One assumes the end results of a learning process the crucial measure of that process. The educational psychologist, by contrast, Van Parreren says should be primarily interested in those actions, behaviors of the learner which result in changes of performance. The task of the educationally oriented psychologist becomes fourfold:

a) analysis of performance results
b) analysis of the states the learner traverses to achieve these results
c) an analysis of the conditions of the learning process
d) an analysis of the future functioning of the learning achieved.

Though these insights may not be startlingly novel they place an emphasis on close and enduring contact between researcher and reader which, I maintain, is not now a part of our research tradition.

The contrast sketched above is sometimes couched in terms of quantitative analysis and qualitative analysis of behavior. It strikes me that an increase in the frequency of observations on readers may go a long way to detecting and documenting qualitative shifts in performance. (I deliberately duck the philosophical issues involved in reducing quality to quantity). A simple example may clarify what I have in mind. In studying the acquisition of synonyms I teach a set of synonym pairs over a two week period. At the end of the treatment I measure each student's performance and relate it to such variables as verbal fluency, reinforcement schedules, or what have you.

What I don't know is that three of the eight experimental subjects for the first four days learned by rote association the word pairs involved. Only then did they realize (discover, etc.) the principle of "same as" involved.

I maintain that this kind of information is important and, moreover, that reading research has done a poor job of zeroing in on these qualitative changes in the learning process. The branch of psycholinguistics associated with the Goodmans employs a methodology conducive to the kind of research I suggest, but their range of phenomena is too restricted and their isolation from traditional hypothesis testing too absolute.

The work of Hansen and Lovitt (1977) is another illustration of the commitment to the kind of long term, intensive data collection I have in mind. They use *Applied Behavior Analysis* to teach subjects' acquisition of basic reading skills, mostly decoding. ABA, these authors say, is characterized by direct and frequent measurement, analysis of individual data and experimental control.

ABA comes from a very narrow tradition of behaviorism and has found distinct favor with learning disability researchers. This, I think, is incidental to the focus of ABA. Its contribution lies in the concept of intensive monitoring of the teaching/learning process and the admitted relevance of data on individual subjects.

I am not yet arguing that we can build sound theories on data obtained from small sets of students but I do maintain that (a) the source of reading research lies in constant observation of the reading and (b) that the purpose of predicting future behavior data from a limited set of real individuals may be as useful, or more so, than data on the mythical average individual produced by statistical analysis. Prediction by analogy (Johnny is like Mary, so,. . .) can be safer than prediction by generality. From an epistemological view this position is far less naive than it may appear at first.

One way of dealing with complex phenomena (such as the reading of these children, in this book, in this classroom, etc.) is dealing with them in as concrete a fashion as is possible. Hence the analogy approach touched on above.

A quite different approach to complex phenomena is through statistical decomposition and reconstruction by identifying simple variables making up the complex and by relating them in some kind of mathematical model. Fisk (1977) makes a strong argument from a philosophical point against the assumption that we can know complexes from their constituent parts. In the psychologists' language his position is Neo-Gestaltist: not only is the whole more than their parts, the function of the parts can only be known in their relationships to the whole.

To make this more concrete, I note that in the October issue of the *Journal of Verbal Learning and Verbal Behavior*, Levy (1977) opts for an interactive model of reading in order to explain the relationship between speech (or sound) analyses of printed text by the reader. She also notes that the "relationship is not straight-forward". I can imagine numerous adoptive relationships between different levels of decoding and language skills and different text demands in terms of decodability, linguistic and cognitive characteristics of the text involved. I see no point in studying the contribution of decoding to comprehension without taking in account the states of each of the other variables (and I only mentioned a subset of the cognitive variables involved).

Kerlinger in his recent AERA presidential address (1977) spent some time illustrating that methodology has a profound effect on practice by pointing to the emergent technique of analysis of covariance structures. I quote: "It integrates factor analysis, including hypothesis-testing factor analysis, multivariate analysis, study of change and path analysis for example, in a framework explicitly oriented to theory and hypothesis testing." (p. 9)

We are all very familiar with the limitations of analysis of variance *vis a vis* complex phenomena. The partialing out of more and more variables, a process which should be based on theoretical considerations but hardly ever is, is severely hampered by the difficulties of interpreting and representing higher order interactions. Any technique which can handle complex events more adequately is welcome.

Yet, I wish to note that statistics should remain a last resort tool of the social science researcher. Powerful statistics have hidden much of the dubious nature of the sociological laws derived from questionnaire data, for instance (Borgatta, 1969). Of all people Oscar Buros (1977) holds that advances in statistical sophistication hindered conceptual progress in test construction. Again, in the inaugural number of *Instructional Science*, now five years ago, Meredith (1972) notes:

> ". . . we need to ask more and more simple questions if research is to cohere. Otherwise we hand ourselves over to the statisticians and this means letting their mathematical structure determine the structure of our knowledge — which is precisely what factorial psychology has done. It represents an abdication of thinking and a denial of sense in the original test data. Any record of actual performances has a good deal of differential sense in it, but once we start scoring, summing, calculating means and standard deviations and correlations we have abandoned sense. . ."

In the view of Meredith (a student of Spearman incidentally) the first obligation of a researcher is to feel the sense of this phenomena. Therefore a student of behavior must get a sense of behavior. To return to my theme: reading researchers should be in their classrooms or very near them.

For whatever reasons we have created a very false and disturbing climate for reading research in our schools of Education. (Parenthetically, even a basic research propagandist as Suppes places the responsibility for educational research squarely within facilities of education. (Suppes, 1974)).

A number of years ago I established that the education faculty of one particular major university in the U.S. on the average published less than one publication in a refereed journal every two years and, more disturbingly that many faculty members hardly published atall. Recently Arlin (1977) using the same methodology but on a much grander scale collected evidence of lack of sustained inquiry among educational researchers across North America.

In an analysis of eight years of professional journals abstracted in the *Current Index to Journals in Education*, Arlin found that (a) about half of all publications were produced by one-time authors and (b) that between 60 and 75% of all the authors associated with the 130,000 plus articles analysed, published only once during the eight year period studied.

Arlin laments the "lack of sustained inquiry", and rightly so. I suggest that the situation in effect is more perturbing than his data reveal. The writing of many multiple article authors, a proper analysis would reveal, is characterized by frequent shifts from topic to unrelated topic.

We are all familiar, perhaps too painfullyso, with the faculty member strong in research methodology who today publishes an analysis of the acquisition of "French speech patterns" and tomorrow an account of "educationally instructive initiation rites among Canadian native Indians." Someone once suggested an index of scholarly contribution (SC) as follows:

$SC = 1 - A/p$, where $A/$ = the number of different areas of inquiry
engaged in and
p = number of publications

I suggest that for many reading researchers this index would approach zero.

I am not harsh on individuals. I do, however, fault the currently prevailing training and reward systems in major universities. Conditions for which, I might add, we share considerable responsibility.

As to the training of reading researchers within faculties of education too little emphasis is placed on historical and conceptual analysis of the phenomenon of interest. The term "research skill" carries the connotation of "data analysis" too frequently. Philosophy of science and practical exercises in critical and creative thought (dare I suggest reading research variations of that favorite parlor game 20 questions?) routinely take the back seat to "introductory statistics" 1, 2, and perhaps 3.

I am by no means suggesting a reduction in exposure to techniques of design and analysis. I am saying that in most programs of training for scientific research the stress is on research at the expense of the requirement that this research be scientific.

A moment ago I mentioned existing professional reward systems. I am convinced that the relative absence of continuous and sustained research among productive members of faculties of education is in part due to the pressure to produce quantity rather than quality of work.

Many of us do research for professional rewards. Perhaps someone will produce a study sometime validating this assertion by showing peaks of production in periods immediately prior to promotion and tenure decisions. The criteria for rewards have, whether we like it or not, a definite influence on the research production. The lackadaisical researcher receives periodical impulses to churn out some indifferent work. Far more serious are the facts, however:

a) that many young and capable faculty members believe it to be against their best interests to give themselves time to pursue the study of a particular phenomenon in leisure and with thoroughness and
b) That they, rewarded in measure, come to believe to have embarked upon a career of scientific research.

Improvement of reading research, the strengthening of a genuinely scientific study of both the learning and, of the teaching of reading requires patient manipulating of non-trivial variables in what I refer to as a classroom or a real learning context and what Uri Bronfenbrenner (1976) designates as the learner's micro-environment. Such study requires thorough knowledge of the history of the variables manipulated and of their epistemological status.

Many of the persons in this audience are senior members of their respective faculties, often involved in its administration. My appeal to you is to increase the emphasis on the quality of inquiry in assigning professional rewards to colleagues.

Reading Departments and departments of Educational Psychology have demonstrated adequate competency in doing studies. For many the time has come to start doing research.

Kerlinger, in the AERA address I referred to above, has made a strong plea for support of basic research in education. The arguments he advanced are straightforward. Dominant is his belief that basic research has more potential for practical pay-off than many applied research efforts. Much of the support for this belief is drawn from the Comroe and Dripps (1976) study of advances in medical practices. Kerlinger notes that basic research was responsible for almost twice as many "key articles" than non-basic R and D taken together.

I have no desire to debate Kerlinger's position in general. However, he addresses himself to reading specifically, in a manner immediately relevant to my topic today. Permit me a rather lengthy quote:

> "Answers to reading problems lie not in many researches aimed at telling teachers how to teach reading. They lie in research aimed at understanding

> the many aspects of human learning and teaching connected with reading. Study of reading in and of itself is almost invariably unproductive. We must study reading in the context of perception, motivation, attitudes, intelligence and so on. In other words the goal should not be the improvement of reading. It should be understanding of the relationship among the many complex phenomena related to reading. Research directed to improving anything but minor skills is doomed to triviality, frustration and defeat. To improve something as complex as reading requires understanding of reading and many related phenomena, a very difficult task indeed. And there is, of course, no guarantee of improvement in children's reading, even if basic research on phenomena related to reading is done." (p.7)

I understand and, in part, sympathize with Kerlinger's rejection for pragmatic practical pay-off and for relevance. It is clear that his tenure at the University of Amsterdam with its strongly Marxist oriented Education faculty causes him much intellectual discomfort and may have strengthened his resolve to safeguard disinterested basic research. I do have a number of critical observations on his perspective, nevertheless.

First, it is not clear to which degree Kerlinger distinguishes between "research aimed at telling teachers how to teach" and basic inquiry in how people do teaching. Surely we must admit of basic study of the variables involved in teaching reading and their relationships.

Secondly, from his examples in this quote and from comments throughout his paper it is clear that Kerlinger insists on equating basic research with foundational or disciplinary research.

In this he is in the company of such distinguished COBRE (Committee on Basic Research in Education) propagandists as Carroll and Suppes (1974) who identify no less than 12 disciplines related to education ranging from psychology to the biosciences.

Where as, no doubt, reading research can benefit from advances in many of these related fields there are no *a priori* reasons why inquiry in educational processes must be limited by the epistemology embedded in the "foundational" disciplines. This needs repeated stressing.

Psychologists, as we know them, will never understand how children learn to read. The reason is simple. Most children learn in an environment in which many factors interact continuously. Moreover children have histories the influence of which may be cancelled out or minimized in psychological experiments but which most definitely will play in the actual learning process. Learning to read, learning to comprehend better, in schools is an educational process, not merely psychological, or sociological, or biological or linguistic. A confluence of perspectives at one time viewing one phenomenon is needed.

Western scientific thought pushes for identification of simple and isolated variables. An attending danger is that we may destroy the phenomenon we wish to study and produce irrelevant basic research. (That is, basic research on pseudo phenomena). In surveying the many (quasi) psychological, (quasi) sociological, quasi etc. treatments of "reading" which surface in the literature and at conferences it seems to me that at times we resemble scientists who have the means to study atoms of compound substances without being capable of proper separation and identification of the molecules they make up.

Here, perhaps, is my most basic disagreement with Kerlinger. He wants to study reading in the context of perception, motivation, attitudes, and so on. I believe that first of all I want to study perception, motivation, attitudes in the context of reading and, moreover, I don't want to study them in isolation from each other or from their organizing educational context.

Suppes (1974) in his analysis of the relationship between Foundational disciplines and education designates educational phenomena as the source of educational theory. However his treatment of the issue avoids the problems of fracturing of those phenomena as a function of the application of the conceptual and technical tools.

I am not certain that educational psychology, educational sociology etc. are capable of generating appropriate theories accounting for say, learning to read, in a public school context. They may need to develop a language and tools of their own beyond their current differentiation of their originating disciplines.

In classroom learning the interaction is the main event. Unless we make those interactions our subject of study we will have very little to say about reality and those who maintain that research has no contribution or only a very limited one to "the real world" are right.

In considering the relationship between basic research and the teaching and learning of reading it is important to remember that in the case of the physical sciences engineering intervenes between science and practical application.

About seven years ago Edmund Coleman in an elaborate proposal to the USOE sketched some ways in which the engineering concept might be applied to the translation of basic reading research and theoretical formulations into statements about the teaching of reading. In essence he proposed a stage in which variables which were discovered to have a relationship to the acquisition of reading skills be calibrated. As an example he constructed tables for the learnability (number of trials to criterion) of individual phoneme grampheme correspondences, for instance.

Another example of this engineering concept, is found in the development of readability formulae. The intolerable variations in readability of a particular passage between formulas, (I calculated the readability of 36 passages used by Coleman and Miller (1968) using five formulas (Flesch, Dale-Chall, Fry, Smog and Forecast). On some passages the range of estimates was as large as six years. One passage for example was rated grade 2 by one formula, grade 8 by another.) the variation between passages in a single text source (Bradley and Ames, 1977) and the problem of matching difficulty of text and ability of readers places the value of readability as currently conceptualized much in doubt.

Readability research is a prime example of applied research conducted without sufficient consideration for the educational context in which the application is to take place.

Coleman's proposal, however, should not be dismissed lightly. We have preciously little basic research and theory regarding either reading, the learning of reading or the teaching of reading. Attempts to directly translate from theory and/or basic research to practice are naive and lead to disappointments. Systematic applied engineering research may provide some answers in this respect.

Scriven, (1964) in an insightful essay notes that relative to such sciences as astronomy, psychology is in a very unfortunate position: it has to compete with common sense. And, he adds, fifty thousand years of common sense have resulted in a great deal of psychological knowledge being deposited in our language.

Educational research, and in particular reading research finds itself in a similar position. Everyone can read, everyone knows that reading can be difficult, that hard words make a story difficult, that long words are often hard words; that if there are many words in a story you can't pronounce chances are you won't understand it so well. Everyone knows, especially if they are CB'ers, that words only have meaning in defined communication contexts. And so forth.

So, what is left for psychology? As Scriven puts it:

> "Common sense not only steals the easy pickings from the field of study of human behavior, but it passes on to the science of psychology a set of extremely embarrassing questions because the everyday interactions of human beings leads them to need much more than their common sense knowledge quite frequently."

Scriven then goes on to say that though physicists are never asked to predict the fall of an individual leaf of a tree, psychologists are required to make predictions about the behavior of an individual learner at a point in time.

In my opinion Scriven, by this statement, questions the very existence of generalized theories of behavior, of the utility of a general psychology itself. One can view the possibility and utility of a generalized theory of a set of phenomena as a function of the degree of variation among the individual phenomena. It then becomes clear that a theory accounting for the reading process is less viable than a theory accounting for the behavior of gasses.

When faced with the demands of research in reading we often seem to retreat into the safety of translating common sense knowledge into pseudo psychological terms. A point in case is the swift adoption of the language of semantics and pragmatics currently in vogue for the same kinds of research questions expressed as little as five years ago in terms of Chomskian vocabulary. An analysis of the conference program of this year demonstrates this problem quite nicely. When this translation is a mere surface response, as in my judgement often is the case, I react as Archie Bunker to one of Meathead's learned speeches: "Why do you always have to use big words to hide that you don't know nothing?"

I view the proliferation of dependent variables upon which I commented a few years ago as a similar avoidance of reaction. (Editorial, *Journal of Reading Behavior*, Volume 6, Number 3)

Do we as reading researchers stay away from the classroom for fear of not being able to cope with the complexity of the phenomena?

One area where psychology, or at least psycholinguistics seems close to catching up with common sense is reading comprehension as a process. I believe that it is fair to say that the currently most widely held theoretical beliefs about reading comprehension are adequately summarized as follows:

Reading comprehension involves an interaction of some sort among decoding, language and knowledge of the world. The role of each of these factors depends on the level of the difficulty of the task involved, and the ability and orientation of the reader.

This is my brief summary of statements on the topic of Guthrie's recent book on comprehension, cognition and language (Guthrie, 1977).

I suggest that only a far more detailed analysis of the phrase "interaction of some sort" elevates this summary above the status of a commonsensical statement.

To offset the negative aspects of the proceeding comments I hasten to refer to my rather lengthy and optimistic treatment of the contributions I expect from lines of research exemplified by the work of Perry Thorndyke, (1976) among others (Tuinman, 1977). Now linguists have finally legitimized the study of semantics, pragmatics and rhetorical structure we should make some advances.

Where mere commonsense has not been able to guide us is in the development of effective techniques for teaching comprehension. Though psychometric research by Davis (1971) and others has empricially validated time honored pedagogical taxonomies there is very little teaching going on of main idea, of sequence, of predicting outcomes other than raw practice. After performing tasks related to these skills, discussion follows in terms of particulars, not in terms of the structure of the processes involved.

Perfetti (1977) perceives this when he remarks after summarizing his view of how people comprehend that of course, this doesn't tell us how people arrive at this ability nor how it should be taught. I paraphrase:

I call for basic research on the acquisition of comprehension skills by learners in an educational environment.

I see learning to read as a process which alternates between acquiring basic concepts about the structure of written language and application of these concepts in practice. The order and rate which these concepts are presented and learned depends in part on the teaching strategies employed.

At a very general level we know that learning to read becomes difficult for some children when they (a) fail to acquire these basic concepts and/or (b) fail to develop sufficient mastery in their application at any given stage.

For now I see a legitimate task for basic research into the learning-to-read process in a focus on the identification and analysis of such crucial concepts; an analysis of their relationship; of the development of automaticity in the application phase; of the limits of generalizability to specific pedagogical contexts. This kind of research has been neglected, I submit, for both the learning to decode and the development of comprehension, but more so for the latter.

I suggest that this task requires researchers sensitive to children's experiences in real classrooms. We do need a psychology of reading which is capable of explaining how people read with real books and how people learn to read in real classrooms.

If such a psychology is outdated when books and classrooms disappear or change in appearance, so be it. Psychology isn't timeless. It is an effort to understand reality as it is experienced now.

De Bono's (1976) second law states that scientific proof is usually no more than lack of imagination in providing alternative explanations. He refers to the unique explanations fitting one's data well as the Village Venus effect. The villagers think their Venus is the most beautiful because their limited experience does not allow them to imagine a more beautiful girl.

If one accepts this law, and I cannot think of a reason why one shouldn't, the role of experience and creativity on the part of the researcher becomes clear. Truth becomes a matter of temporary lack of alternatives. Those lacking in their imagination are surest of their truths. I conclude in suggesting that immediate and intimate contact with readers is a prime source of alternative explanations for reading phenomena. I urge in particular those who are engaged in basic reading research to seek that contact.

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DEVELOPMENT OF KINDERGARTEN CHILDREN'S UNDERSTANDING OF CONCEPTS ABOUT PRINT AND ORAL LANGUAGE

There seems to be little doubt that a child's linguistic abilities are directly related to a child's ability to profit from reading instruction. The positive relationship between oral language performance and reading ability has been firmly established (Strickland, 1962; Loban, 1963; Chomsky, 1972; Clay, 1972a; Lundsteen, 1977), and the importance of the quality of the oral language to which the child has been exposed in the achievement of reading has been emphasized (McCormick, 1977).

Evidence that many children do not enter formal reading instruction with extensive knowledge of concepts related to the process of reading has recently been offered, however. Clay (1975) found that 30 percent of a group of students new to school will make such print-related concept errors as looking at the picture when asked to look at the story. Clay found that even after six months of instruction, half the children still confused the labels "word" and "letter." Downing and Oliver (1973-1974) demonstrated that children do not always have the same concepts concerning a word that their teachers assume they do.

Since many teachers may have inaccurate expectations concerning the linguistic abilities of their students who are beginning reading, this study was conducted to observe the development of kindergarten children's oral language performance and knowledge of print-related concepts. Oral language performance was measured by the Record of Oral Language (ROL) developed by Clay, Gill, Glynn, McNaughton, and Salmon (1975), and knowledge of print-related concepts was assessed by Clay's (1972b) Concepts About Print (CAP) Test.

METHOD

Subjects

The population consisted of the kindergarten students of four elementary schools of a suburban north central Texas school district. These four schools have 14 kindergarten classrooms taught by seven teachers and had a kindergarten enrollment in September, 1977, of 265 children. Excluded from this population were children who could not speak and/or understand English, were six years of age before September 1, 1977, or had a visual, auditory, or motor handicap that would prevent them from being able to follow directions and/or participate in the study. Sixteen children were excluded for these reasons. Seventy-five children were then randomly selected from the remaining 249 kindergarten students. The parents or guardians of 61 (81.3%) of these 75 children consented to the participation of their children in the study. During the investigation, five children in the sample moved from the school district, and the available scores of these participants were not analyzed. The remaining sample of 56 children had an ethnic makeup similar to that of the school district and consisted of 29 males and 27 females who had mean ages of 68.2 (*S D* =3.3) and 69.1 (*S D* =3.8) months, respectively, at the beginning of the study. Based on their ages at the beginning of the study, the participants were assigned to one of three age levels, 63 through 66 months, 67 through 70 months, and 71 through 75 months.

Procedure

In individual interviews lasting 15 to 20 minutes, each child was administered the CAP and the Levels Sentences of the ROL on three occasions during the kindergarten year: November 16 to December 5, 1977; January 9 to January 17, 1978; and February 27 to March 9, 1978. The ROL assesses the child's linguistic abilities by requiring the child to repeat sentences of varying difficulty read by the interviewer. The Levels Sentences of the ROL consists of three groups of sentences with complexity of the sentence structure increasing from Level 1 to Level 3. Each level contains 14 sentences of seven different sentence types making a total of 42 items in the test. The child receives credit for each item if the child is able to repeat the sentence without error; so the range of scores is between zero and 42. The CAP and ROL were standardized on New Zealand children, and with the agreement of one of the authors of the ROL (Glynn, 1977) six words in the Levels Sentences of the ROL that seemed idiomatic were replaced with their American English synonyms.

The CAP consists of a children's picture book entitled "Sand" that the interviewer reads to the child. During the reading the child is asked 24 questions to determine if the child understands reading-related concepts such as rules of directionality, differences between letters and words, use of punctuation, etc. Each question is scored right or wrong yielding scores between zero and 24.

RESULTS AND DISCUSSION

The mean number of correct responses on the ROL and CAP are presented in Table 1. These means were subjected to separate 3 x 2 x 3 repeated measures analyses of variance for the ROL and CAP; age and sex of the subjects were between-subjects variables, and the time of the testing was the within-subjects variable. Significant *F* values were followed by the Newman-Keuls test.

A significant main effect of time of testing in the analysis of the ROL scores revealed that the mean number of sentences repeated correctly increased steadily from the first to the third occasion, $F(2,100)=26.13$, $p<.001$. While these differences are small and may be due to a practice effect, they suggest that the syntactic competence of the kindergarten child is continuing to develop at that age. Although older children generally scored higher than younger children and females scored higher than the males, these differences were not siginificant ($p>.05$). In addition, no interaction was significant in the analysis of the ROL scores.

The analysis of the CAP scores also yielded a significant time-of-testing effect, $F(2,100)=139.50$, $p<.001$, and the multiple comparison test indicated significant gains occurring across each lag. As was the case with the ROL

TABLE 1
MEANS AND STANDARD DEVIATIONS OF RECORD OF ORAL LANGUAGE AND CONCEPTS ABOUT PRINT

Sex	Age	n	Testing Occasion					
			Nov., 1977		Jan., 1978		Mar., 1978	
			M	SD	M	SD	M	SD
			Record of Oral Language					
Males	63-66	8	18.6	14.0	20.0	13.9	22.6	14.5
	67-70	13	22.2	9.5	22.1	9.7	25.3	8.9
	71-75	8	20.8	8.3	23.1	8.8	25.4	6.4
Females	63-66	8	24.6	13.1	25.5	14.0	25.6	14.1
	67-70	6	20.5	10.8	22.5	12.0	24.2	11.3
	71-75	13	23.8	10.3	26.2	10.4	28.5	10.1
	Total	56	22.0	13.5	23.4	11.0	25.6	10.8
			Concepts About Print					
Males	63-66	8	5.9	4.7	7.0	4.6	9.5	5.4
	67-70	13	7.1	3.7	7.8	3.6	9.4	4.3
	71-75	8	6.3	3.3	8.3	2.6	10.9	3.4
Females	63-66	8	6.3	3.6	7.8	4.0	9.9	4.2
	67-70	6	9.3	3.2	10.8	1.9	12.2	3.3
	71-75	13	10.5	4.3	11.4	4.2	13.1	4.0
	Total	56	7.7	4.2	8.9	3.9	10.8	4.3

scores, while the gains in performance on the CAP from testing to testing were significant, they were not impressive; an improvement of only about three points occurred over more than half a semester of kindergarten experience. It is noteworthy that the means of the average child on the March administration, near the end of the kindergarten experience, was 10.8, less than half the possible score on the CAP. If the assumption can be made that the CAP measures those concepts that are necessary for the development of reading, these findings of small gains and a low end-of-kindergarten mean support the view that the average kindergarten child may not be linguistically or cognitively ready to profit from formal reading instruction (Robinson, 1955; Elkind, 1975; Lundsteen, 1977).

To determine whether the participants would acquire the CAP metalinguistic concepts before beginning formal reading instruction in the first grade, the CAP was administered to the available 51 participants in September, 1978. The mean score for this administration was 13.0 which was significantly higher than the mean of the third CAP testing, $t(50) = -5.4$, $p < .001$. This finding that the average child in the present sample at the beginning of the first grade answered only about half the CAP items correctly suggests that some of the concepts assessed by this test may not be crucial for basic reading acquisition. For example, as of the March, 1978, administration of the CAP, four participants were classified as readers by their teachers, and the mean of these CAP scores for these children was 16.2.

The analysis of the CAP scores indicated that the overall mean for the females (10.4) was significantly larger than that for the males (8.0), $F(1,50) = 4.25$, $p < .05$. The absence of sex differences on the ROL and consistent effects in favor of the females on the CAP suggest that males and females may differ in reading readiness, although they are similar in oral language development.

Another sex difference was revealed when the age of the child in months was correlated with the child's CAP score. For the girls the Pearson correlation coefficients between age and the three CAP scores of the kindergarten year and the CAP score at the beginning of the first grade were .49, .44, .36, and .41, respectively, $p < .01$. The similar coefficients for the boys were .09, .20, .16, and .02, none of which was significantly different from zero ($p > .05$). The correlations between age and the three ROL scores were not significant for either males or females. The sex differences in correlation coefficients for the CAP test do not appear to be due to a sex difference in the distribution of any variable. Measures of skewness were computed for each variable and the difference in measure of skewness between the sexes for each variable was tested for significance. None of the skewness differences reached significance. In addition, the mean ages of the boys and girls did not differ, $t(54) = -.95$, $p > .05$. That performance on the CAP test is positively correlated with age at each testing for the females but not for the males is intriguing, but at the present time no adequate explanation for these differences is evident. Perhaps they reflect the existence of different critical periods for the acquisition of these print-related concepts or point to different sex-specific intrinsic or extrinsic motivational influences on the development of prereading skills occurring at this age.

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AN ANALYSIS OF CURRENT RESEARCH ON THE METROPOLITAN READINESS TEST AND FIRST-GRADE READING ACHIEVEMENT

Even a brief review of the research literature on beginning reading readiness confirms Underwood's dictum that "the history of science is the history of relentless analysis" (1957). Demographic, intellectual, perceptual, linguistic, attitudinal, and instructional factors have been relentlessly analyzed individually and in combination to determine their effect on beginning reading success. As of 1972, aspects of some of these factors have been combined into 29 published tests which purport to measure students' readiness for beginning reading instruction (Buros, 1972). Of these 29, the *Metropolitan Readiness Test* (MRT), (Hildreth, 1964) is used most often in our public schools (Maitland et al., 1974). The type of pace of beginning reading instruction that numerous children receive is often decided, in part at least, by their performance on the MRT. A careful look at current research evaluating the use of the MRT as a prereading assessment instrument is therefore warranted.

To provide focus while examining the research articles, specific criteria were set. These criteria were selected from those suggested in the literature by various reading authorities. Several articles were consulted (Baker, 1968; Barrett, 1970; Dykstra, 1967; Farr & Anastasiow, 1969; Hillerick, 1978; MacGinitie, 1969; Rude, 1978; and Wanat, 1976) and the criteria they suggest for research on readiness tests to be meaningful were synthesized. From this synthesis, the following questions were asked:

1. Is the effectiveness of differential instruction based on MRT results given?

By far, the most common, urgent recommendation among the reading authorities cited above was to conduct studies wherein students are individually diagnosed, instruction and the criteria of achievement adapted, and effectiveness of the instructional intervention reported. The predominant call was to determine *how* children are ready to begin reading instruction — not *if* they are ready. If studies were to follow this recommendation, the MRT would be used mostly as a screening device to make tentative decisions about students. Research studies would report the results of students' initial screening along with the diagnostic follow-up, the subsequent adaptation of instruction and then later reading achievement. This would all be an attempt to derive instructional implications from readiness testing.

2. Is the time of the MRT administration stated?

Readiness tests are generally administered either at the end of kindergarten or at the beginning of first grade. If researchers choose to study the prediction validity of the MRT, reporting the time when it was administered becomes important.

3. **Are the sample subjects' characteristics adequately described?**
   Previous school experience, SES, race, sex, IQ and linguistic performance, among other variables, have differing effects on children's ability to learn to read. It behooves researchers and research journals to provide as much about their research subjects' traits as possible so others can evaluate the MRT's validity with differing groups of children.

4. **Are the methods and materials for reading instruction adequately described?**
   Certain instructional variables may enhance reading success in one setting but not in another. For instance, teaching students to blend isolated sounds through auditory and speech channels seem more necessary for success in a synthetic phonic program than in a whole-word, analytic approach. In order to evaluate the MRT's validity with various instructional approaches, the treatment students receive must be delineated.

5. **Is the criterion of reading attainment given?**
   Since reading is such a multi-faceted phenomenon, it is necessary to report the criterion measure used to describe it. Otherwise, evaluating its ability to predict other criteria becomes guesswork.

6. **Is the MRT's ability to predict an individual student's reading achievement reported?**
   For accurate prediction of individual achievement, the correlation between the predictor and the criterion must be quite high. Additional statistical information on the prognosis of individuals may be determined by using such techniques as expectancy tables or discriminant analysis.

7. **Does the study have adequate power to detect possible relationships?**
   Statistical power analysis indicates whether sampling error (beta risk) was high. Beta, or Type II, error occurs when one has accepted the null hypothesis when it is, in fact, false. Having a small sample raises the beta risk and reduces power.

FINDINGS

Fifteen original research studies of the MRT published since 1969 were located and examined according to the seven criteria listed above. It is important to note that only studies dealing with the MRT and first-grade reading achievement were chosen for this review. Many of the findings are displayed in Table 1. This form allows one to readily integrate the findings of several studies and is unlike traditional reviews such as Livo's (1972) which describe the highlights of each study in running text.

The entries in Column A show that the criteria most strongly advocated by the reading authorities cited earlier is totally lacking in these studies. None of the original research reviewed here measured the value of the MRT as part of a diagnostic battery for making instructional decisions. In no instance was the

TABLE 1

Analysis of 15 studies of relationship between MRT and first grade reading achievement.

STUDY	N	A. Question No.1:	B. Question No.2:	C. Question No.4:	D. Question No.6:		E. Question No.7:
		Differentiated Instruction	Time of Admin.	Instructional Treatment	r	MR	Power
Bolig & Fletcher	625	No	Post–K	N.R.*	.72 .61	.73 .61	.995
Brown	30	No	Pre–1st	N.R.	.46		.61
Buttram et al.	97	No	Post–K	N.R.	.67		.995
Coffman et al.	156	No	Post–K	N.R.	.62, .63, .59, .68, .59, .58, .56, .59		.995
Coffman et al.	109	No	Post–K	N.R.	.50, .54, .56, .52		
Engin	100	No	Post–K	N.R.		.63 .58	.995
Goodman & Wiederholt	49	No	K & 1st	N.R.	.64	.71	.98, .995
Harckham	553	No	K	N.R.	.63		.995
Huberty & Swan	58	No	Pre–1st	N.R.	.71	.75, .71, .73	.995
Lewis	40	No	Pre–1st	N.R.	.67 .61		.95
Randal et al.	62	No	Post–K	N.R.	.34	.34	.41
Rubin	910	No	Pre–K Pre–1st	N.R.	.52, .54		.995
Stevenson et al.	144 151	No	Pre–1st	N.R.	.44, .48		.995
Telgedy	56	No	Post–K	N.R.	.70, .58, .67		.93
Williams	133	No	Post–K	N.R.		.65	.995

*NOT REPORTED

MRT used for screening and then followed by diagnostic placement and differentiated instruction of individuals. This current research provides no support for adapting type of reading instruction on the basis of MRT scores.

As data in Column B indicate every study noted when the MRT was administered. The prevailing practice was to give it at the end of students' kindergarten year. Rubin (1974) compared pre-K with pre-first-grade testing and concluded that the MRT provided basically equivalent predictions regardless of when it was administered. In order to further investigate this issue, the correlation coefficients from eight studies giving the MRT at post-K (spring of the year) were compared with those from five studies giving the MRT at pre-first (fall of the year). Using Fisher's Z transformation to compile the results, the average prediction value of the post-K studies was found to be .54. The average for the pre-first studies was .59. This slight difference tends to confirm Rubin's conclusion that the time of readiness testing has little effect on later prediction of group achievement.

The sample subjects' traits were reported in widely varying detail. While Hubert and Swan (1974) reported subjects' SES, IQ, race and sex and even partialled out pre-school experience to see its effect on the predictive validity of the MRT, Lewis (1974) simply reported the geographic location of his subjects. All the studies provided some description, but this important aspect seems to have received cursory attention. Because of this, determining aptitude interactions with the MRT becomes difficult.

As Column C data show, no study provided information about the reading instruction subjects received. One is regularly given the correlation between predictor and criterion scores, but left wondering what treatment the subjects received to influence that criterion measure. This aspect of measuring aptitude-treatment interactions was given no attention by these studies.

The criterion of reading achievement varied widely among the studies. For instance, Buttram et al. (1976) gave no indication whatsoever of the specific reading measure used. Even though the *Stanford Achievement Test* was the criterion in three studies, different scoring combinations were used in all three. Bolig and Fletcher (1973) used total SAT scores, Huberty and Swan (1974) worked with individual SAT subtest scores, and Randel et al. (1977) computed a total raw score from the reading subtests.

As Column D entries show, zero-order correlation coefficients between the MRT and various measures of first grade reading achievement range .34 to .72. There was no consistent pattern of correlations between the MRT and the various criterion measures of word recognition, meaning vocabulary or paragraph comprehension. Of the 29 coefficients reported in these studies, the median value was .59 and the mean value computed through Fisher's Z transformation was also .59. This means that for the 3,122 students involved in the studies compiled here, approximately 35% of their variability in first grade reading achievement can be determined by knowing their MRT scores. While this is a rather substantial figure and indicates that the MRT is appropriate for group evaluation and prediction, it is still not high enough to allow individual prediction of reading success. There is still much room for individual variation. In addition, only one study, Stevenson et al. (1976), followed up students' prognoses to report the "hits", "misses" and "false alarms" in an attempt to specify the predictive validity of the MRT for individuals.

The multiple regression coefficients in Column D range from .75 to zero (non-significant findings). The median value here is .65 and the mean is .62. These findings, based on 1[illegible] multiple regression equations reported in the studies, indicate a slight overall increase from the average zero-order correlation of .59. The validity of the MRT seems to be little changed when other variables are entered into a prediction equation. This attests to the relative strength of the MRT to stand by itself in predicting group achievement.

Column E lists each study's power value obtained from Cohen's tables in his *Statistical Power Analysis for the Behavioral Sciences* (1969). As mentioned earlier, power is an estimation of one's probability of avoiding Type II error. Power especially reflects the sample size of a study, although effect size and alpha risk also determine its extent. Cohen recommends that a study have a minimum power value of .80 to adequately control beta error. As shown, all but one study exceed the .80 minimum, and the majority exceed .995. The studies reported here had quite sufficient power to detect the relationship between the MRT and first grade reading achievement.

CONCLUSIONS

The findings of this review point out several interesting aspects of current research practices and evidence dealing with the MRT. First of all, few decisions about students' beginning reading instructional program can be based on MRT scores. At least in the studies reported here, no support for adapting instruction according to performance on this instrument was found. Second, it appears that the time of administration does not substantially affect the predictive validity of this instrument. Third, these research reports have largely ignored the effect of aptitude-treatment interactions on the validity of the MRT. Estimating the MRT's usefulness for specific groups of students in different instructional circumstances is difficult since those situations are rarely described well. Fourth, the studies' statistical power is extremely high in the great majority of cases. Finally, the average correlation of .59 between the MRT and first-grade reading attainment seems large enough to warrant predictions of group reading performance. However, even the addition of other predictor variables does not raise the correlation value high enough to allow specific predictions of individuals' performance.

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EFFECTS OF INSTRUCTION TYPE ON WORD PREDICTION BEHAVIORS

Recently the effect of instructional approach upon various reading abilities has been shown to be quite powerful and consistent (Barr, 1975; Cohen, 1975; DeLawter, 1976). Of particular note is the differential effect strong code-emphasis instructional programs exert on the reading errors of early readers.

Barr (1975) found that most first grade subjects adopted the classroom instructional method (phonic or whole-word) even if they previously demonstrated a different consistent strategy. Cohen (1975) suggested poor readers in a code-emphasis approach seemed to reveal a lack of awareness of oral-to-written word responses. DeLawter (1975) presented evidence that code-emphasis instruction produced more nonsense word errors than those receiving other instructional strategies.

While it is generally agreed that skilled readers make heavy use of sematic and syntactic information when reading connected text, it is a point of debate as to how this ability develops and whether instructional strategies exert any substantial influence upon this sequence. Good readers are seen by some (Goodman, 1972; Smith, 1978) to make more effective use of contextual information while poor readers underutilize these information sources and attend more to grapho-phonic information. This is somewhat analogous to a "levels of processing" model (Craik and Lockhart, 1973) in that the poor reader enters the task at the phonemic level while the good reader enters at the semantic level (Mosenthal, Walmsley, & Allington, 1978).

The question that was the basis of this study is: do proficient young readers instructed with a code-emphasis approach and proficient young readers taught in an eclectic program make equally effective use of contextual information in predicting deleted words?

METHOD

Subjects

Students were drawn from the second grade classes of two school populations. The instructional staff in one school employed a synthetic phonics basal reader series as the primary instructional material and the other staff employed an eclectic program with 3 basal reading series available (none of which were synthetic phonic approaches) with frequent use of language experience activities in reading lessons. Additionally no classroom teacher in this school used supplementary phonic materials on any consistent basis.

All subjects were administered either the reading comprehension subtest of the *Peabody Individual Achievement Test* or the *Metropolitan Reading Test* to screen for reading ability. Only subjects scoring at or above a 2.4 grade equivalent were selected for participation. Subjects in the code-emphasis school had a mean reading grade equivalent of 4.03 and in the eclectic school a mean of 4.12.

Materials

The stimuli were from Pearson and Studt (1975) and are described in detail there. Briefly the stimuli consisted of 12 sentence sets each containing sentences at 3 levels of contextual richness: rich, moderate, and low. Each sentence contained a single deletion. Two target words which fit the deletion were selected — a high frequency word and a low frequency synonym.

Design

All subjects received 12 test sentences, with 4 sentences from each level of contextual richness. High and low-frequency target words were alternated across trials with each subject then required to respond to 6 deletions with the high frequency word and to 6 deletions with the low-frequency item.

Procedure

The task was administered individually and took approximately 25 minutes to complete. Each subject was provided an easy example in an attempt to ensure the task was understood.

Briefly, the experimenter placed a sentence strip in front of the subject and asked that he/she read it (either silently or orally as he/she preferred) and try to predict the word that went in the blank. Subjects were told then any word in the stimulus sentence which they did not know would be pronounced for them if they would ask. After the subject had read the sentence and attempted to supply the word a supportive comment was offered. When the response was not the target word the experimenter displayed the initial grapheme of the target word and asked the subject to read the sentence once again trying to respond with a word that "fit" the sentence and began with that letter. The exposure of single graphemes sequentially from left to right continued until either a correct response was elicited or the whole word was exposed (this procedure is described in detail in Pearson and Studt, 1975).

RESULTS

The data were analyzed using a repeated measures analysis of variance following an arc sine transformation of the proportion of word exposed, prior to correct identification, as the unit of analysis (these proportions could range from 0.00 to 1.00). Cell means are displayed in Table 1 as percent of word needed for correct identification.

2

TABLE 1

Mean proportion word exposed prior to recognition

	WORD FREQUENCY						
	High			Low			
	CONTEXTUAL RICHNESS						
Instruction type	**Rich**	**Moderate**	**Low**	**Rich**	**Moderate**	**Low**	**M**
Eclectic	27.4%	57.5%	61.1%	74.6%	72.6%	84.2%	62.9%
Code Emphasis	23.4%	42.2%	58.4%	58.0%	65.5%	78.8%	54.4%
(difference)	(4%)	(15%)	(3%)	(16%)	(7%)	(6%)	(10.1%)

By comparing the cell means one can see that the subjects receiving code-emphasis instruction required less graphemic information to produce the target word in all conditions. However, this difference is not statistically significant ($F(1,28) = 3.87$, $p = .059$). Congruent with the results of Pearson and Studt (1975) there were statistically significant effects for contextual richness ($F(2,56) = 15.5$, $p < .001$) and word frequency ($F(1,28) = 60.4$, $p < .001$). Additional analyses of the data indicated that subjects from the eclectic program were unable to pronounce a larger number of words after all graphemes had been exposed ($n = 23$) than the code-emphasis subject ($n = 17$). They also required 100% of the graphemes exposed in more words than the code-emphasis readers ($n = 69$ vs $n = 48$). Low frequency words accounted for the vast majority of incorrect responses. As can be seen contextual richness interacted with word frequency in both groups ($F(2,56) = 4.6$, $p < .05$). No other interactions were statistically significant.

DISCUSSION

The differences between the code-emphasis and eclectic subjects were not statistically significant though the former did have a small but consistent advantage across all stimuli types. Since both groups of subjects had mean reading achievement levels quite a bit above grade placement the results suggest that good readers seem to develop similar strategies quite early regardless of instructional type. Perhaps in order to identify effects of differing instructional emphases one must examine the less able readers produced in each program. That the subjects in both groups typically responded to the deletion with a high-frequency word — whether the target was a high frequency word or a low frequency word — affected the magnitude of differences (see Table 1) between subjects with the High-Rich and High-Low conditions evidencing the smallest differences in amount of graphic information necessary to identify the target word.

Finally, these data support the powerful influence of contextual information upon word identification. The high achieving young readers employed this information source consistently regardless of the type of instructional program they had been placed in.

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METHODOLOGICAL CONSIDERATIONS AND DEVELOPMENTAL TRENDS IN CHILDREN'S AWARENESS OF WORD BOUNDARIES

In their classic study "The Boundaries of Written Words as Seen by First Graders" Meltzer and Herse (1969) initiated an interest in children's developing notion of word space and proposed a system of categorizing children's responses that continues to be widely used (Kingston, Weaver, & Figa, 1972; McNinch, 1974). While the authors cautiously restrict their findings to their sample and discuss the influence of the instructional program (basal readers) upon children's notions of word space, they also state that there is a hierarchical ordering of the data which reflects children's changing hypotheses about what constitutes words and their boundaries.

Meltzer and Herse concluded that for the 39 children in their study, who had been instructed with one particular reading series, there appeared to be a sequence of development which approximated a Guttman Scale. They suggest that children's errors reflect qualitatively different hypotheses about words and their boundaries.

Examples of differing types of errors, stages, and hypotheses suggested by Meltzer and Herse include: 1) an initial hypothesis that letters constitute words. Children demonstrate this hypothesis by circling every letter. This begins to be discarded and children form the notion that words are made up of letters. 2) In a second type of hypothesis, number of letters seems to be the salient cue. At this beginning stage of clarity, space is very low in importance and performance manifests itself in the combining of letters with no regard to space. 3) Further refinement occurs when students begin to pay attention to space and do so relatively consistently, unless words are short, in which case they are combined, or long, in which case they are divided. Number of letters continues to be a cue but is combined with increasing awareness of word space. 4) A fourth hypothesis reflects even further refinement. At this stage space is used consistently except when long words contain tall letters.

Use of the Meltzer and Herse categories by other researchers reflects de facto acceptance of the validity of this hierarchical ordering. The present study is an attempt to confirm this ordering in two ways: 1) through the examination of additional student responses to the stimuli used by Meltzer and Herse; and 2) through the longitudinal examination of a sample of first graders.

PROCEDURES

Population

The sample for the study was drawn from two public schools in the

44

suburban metropolitan Washington area. These schools agreed to participate in the study. They each drew from middle class and lower middle class neighborhoods which represent the racial makeup of the county. Twenty-eight girls and 26 boys were randomly selected from the 145 first graders in the two schools. None of these children had had a formal reading instructional program in kindergarten. In addition, 23 girls and 24 boys were randomly selected from the 112 kindergarteners in the two schools.

Test Administration and Description

The visual word boundary sentence task was administered to children by presenting them with the sentence "Seven cowboys in a wagon saw numerous birds downtown," printed in manuscript letters on sentence strips 14 inches long and three inches wide. Tall letters were 3/4 inch in height; the remainder were 3/8 inch in height. Children were asked to count the words. Following this, they were asked to draw a circle around every word. Children were tested individually in rooms separate from the classroom.

Testing for part 1, checking the stages hypothesized by Meltzer and Herse (1969), was conducted from the fourth to the seventh week of school. This involved one administration of the visual word boundary sentence task.

Testing for part 2, investigating children's developing ability to recognize the function of white spaces in defining written word boundaries, was conducted at two month intervals from September/October through June. Twenty-seven first graders were identified on the basis of their performance on the *Metropolitan Readiness Test* (1965) and the *BET Written Language Awareness Battery* (Evans, Taylor, & Blum, in press). Of the 27, 15 had scored near the mid-range and 12 had scored in the low range on both measures. These children were retested bi-monthly with the visual word boundary sentence task.

RESULTS AND DISCUSSION

Table 1 summarizes the performance patterns observed using a scoring system based on the Meltzer and Herse criteria: A, circles words correctly; B, divides at tall letters; C, divides elsewhere than at tall letters; D, combines two words; E, combines letters with no regard to space; F, equates letters and words; O, other. Frequencies and types of errors in addition to words correctly circled are displayed in Table I. First grade and kindergarten data are presented separately so that similarities and differences can be noted. Thirty-seven children obtained perfect scores; of the remaining 84, 17 circled no words correctly (their errors were of types F and O), while 67 circled at least one word.

For both first grade and kindergarten children the most common error was combining two words (Type D). Of the 64 children who made errors, 19 (30 percent) exhibited this error. This finding is similar to that reported by Kingston et al (1972). Kindergarten children exhibit more errors and more types of errors. Of the 35 kindergarten children who made errors, for 7 (20 percent) the second most frequent type of error was equating words and letters (Type F). Five children (ten percent) of the kindergarten group exhibited errors not classified by Meltzer and Herse (Type O). It appeared to the present investigators that several of these kindergarten children did not understand the task.

Examining these data suggests a discrepancy in the sequence of hypotheses proposed by Meltzer and Herse, who suggest that number of letters is a salient cue at an early stage of clarity and is replaced by space as clarity is refined. If the sequence suggested by Meltzer and Herse is correct, children who combine small words would also divide long words and long

TABLE 1

PERFORMANCE PATTERNS INCLUDING FREQUENCIES AND TYPES OF ERRORS IN ADDITION TO WORDS CORRECTLY CIRCLED

Error types and words correctly circled*	A	A, B	A, B, C	A, B, C, D	A, B, D, E	A, B, D	A, B, F	A, C	A, C, D	A, D	A, D, O	A, F	A, O	F	O	Total
First-graders	25	7	1	- -	- -	2	- -	- -	- -	11	1	1	1	5	- -	54
Kindergarteners	12	3	1	2	1	1	1	2	3	8	- -	1	- -	7	5	47
Total	37	10	2	2	1	3	1	2	3	19	1	2	1	12	5	101

* A : circles words correctly
B : divides at tall letters
C : divides elsewhere than at tall letters
D : combines two words
E : combines letters with no regard to space
F : equates letters and words
O : other

TABLE 2

LONGITUDINAL PERFORMANCE PATTERNS OF SELECTED STUDENTS

	Performance*	September	December	February	April	June
Subjects scoring in mid-range on initial readiness measures	1	F	F	F	F	F
	2	A, B	A	A	- -	A
	3	A, D	A	A, B, C	A	A, B
	4	A	A, D	A	A	A
	5	F	F	A	A	A
	6	A, B	A	A	- -	A
	7	A, D	A	A	- -	A
	8	F	E	A, B	A, B	A
	9	A, O	A	A	- -	A
Subjects scoring in low range on initial readiness measures	10	A, D	A, B	A, D	A	A
	11	A, D	A	A, B	A, B	A, B
	12	A, D	F	A, E	A, E	A, E
	13	A, D	A, C	A, C	A, C	A
	14	F	F	A, D	A, D	A, D
	15	A, O	A	A	- -	A
	16	A, B	A	A	- -	A
	17	A, D	A	A	- -	A
	18	A, C	A	A	- -	A

* A :	circles words correctly	E :	combines letters with no regard to space
B :	divides at tall letters	F :	equates letters and words
C :	divides elsewhere than at tall letters	O :	other
D :	combines two words	- - :	subject not retested following perfect performance on two successive testings

words containing tall letters at the tall letters. However, in this sample, of the 64 children who made errors, for 19 (30 percent) the only error was combining two words (Type D). These children circled all other words correctly, including long words and long words containing tall letters.

While a developmental trend can be noted in the data since first-graders exhibited fewer errors and fewer types of errors, there is no strong evidence to support the clearly defined sequence of stages formerly suggested. It may be supposed that the exact sequence may well differ from child to child depending on the timing, type, and amount of print to which she/he is exposed.

Of the 27 children identified in September/October for longitudinal study throughout the school year, nine performed perfectly on the visual word boundary sentence task. An additional three children circled all words correctly except those with tall letters which the children divided at the tall letter (A, B). One child circled words correctly but divided some (long) words (A, C). Nine children circled all words correctly except for combining two (small) words (A, D). Four children circled every letter (F).

These children were retested at two-month intervals until they demonstrated perfect performance on two successive testings. Table 2 summarizes the performance patterns of 18 children who made errors in one of the first two testings. Subjects one through nine initially scored in the mid-range on readiness measures; subjects 10 through 18 initially scored in the low range. No discernible patterns differentiate the two groups' performance. Number of errors, types of errors, sequence of errors dropping out as well as final performance seem evenly distributed between the groups.

Four children (7, 9, 15, 17) whose only error during the first testing was combining two (small) words (A, D) demonstrated perfect performance on all subsequent testings. According to the developmental sequence suggested by Meltzer and Herse, children who combine (small) words — using number of letters as a salient cue — would also divide long words. The developmental pattern of these four children tends to confirm the discrepancy noted in part one of this study.

Examination of the performance of these 18 children reveals a variety of developmental patterns and widely differing rates of development toward clarity (e.g. subject 5 is a particularly striking example of a child who seems to have acquired an understanding of visual word boundaries very quickly. Subjects 8 and 14 look similar although they were unable to demonstrate perfect performance by the final testing in this study).

Twenty-two of these 27 children identified in the mid or low range on readiness measures performed perfectly on the visual word boundary sentence task by June. However, 15 of these children performed below grade level on standardized reading achievement measures. This substantiates a similar finding by McNinch (1974) that while awareness of visual word boundaries seems to be related to readiness skills, this readiness skill is not closely associated with success in learning to read.

CONCLUSIONS

Our data indicate that most children develop clarity about the function of white spaces in defining written word boundaries with exposure to print (i.e., a year of reading instruction). Although a few demonstrate difficulty, even in a group identified as poor readers, only five could not perform perfectly on the visual work boundary sentence task by June of the first grade year.

The results of our research indicate that awareness of interword space, which is an arbitrary convention of written language, develops during the first

48

grade year along with skill in recognizing words. As children recognize that graphic configurations stand for words in their vocabulary they may become aware that white space marks the beginning and ending of the graphemes that comprise these words. It is equally possible that students vary widely in their awareness of this convention of written language although awareness does tend to characterize progress in reading acquisition.

It seems reasonable to conclude on the basis of our data that efforts to isolate qualitative differences that characterize stages of clarity experienced by all children may be futile. It would seem much safer to conclude that exposure to *meaningful* print results in clarity about word space. The nature and pace of this clarity depends on the nature of the child and the quality and quantity of print exposure. Furthermore, we would like to suggest that researchers who wish to understand children's developing notions of the conventions of written language (of which word space is one) must engage in longitudinal naturalistic research along the lines of Read's (1975) study of children's awareness of orthographic structures.

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A COMPARISON OF CONTEXT USAGE BY GOOD AND POOR READERS IN WORD BOUNDARY TASKS

Klein and Klein (1973a) have demonstrated that a technique called "word boundary" is a sensitive measure of the reader's use of context to identify words (see examples under Methodology). Context usage improves efficiency of word identification in connected discourse. Unused or misused context slows word identification considerably. The effect of context, however, as demonstrated by the word boundary studies does not begin to appear until third grade or later (Goldsmith & Nicolich, 1977; Klein, Klein & Doris, 1975) and then continues to grow up through high school (Klein, Klein & Vigoda, 1975). This quality of reader performance is historically and logically a key index of growth in reading ability.

Wiener and Cromer (1967) and Cromer (1970) contend that context usage is also a means to document the nature of reading difficulty. Wiener and Cromer have posited a theory for conceptualizing reading disability which includes four types of disabling conditions: *Defects* (constitutional problems), *Disruptions* (physical, social, and psychological phenomena which interfere with normal progress), *Deficits* (skills and abilities which the immature reader has not yet gained, like word processing skills) and *Differences* (peculiarities of language processing which the authors relate to context usage).

Cromer (1970) has studied context enrichment, grouping words into meaningful phrases, as a means of distinguishing the performance of *Difference* and *Deficit* readers, the two language related categories. Work by Klein, Klein and Hildum (1974) has shown that word boundary tasks can be manipulated for context enrichment, and they used mature oral reading performance to guide the engineering of that enrichment.

PROBLEM

It was the intent of this study to use the technology of word boundary tasks to expand and refine our understanding of language based reading ability and difficulty using the Wiener and Cromer (1967) model as a point of reference. *Difference* readers either fail to use, or misuse context in word identification. *Deficit* readers have a general need for word identification skills or vocabulary. Word boundary tasks with contextual enrichment should clearly discriminate these types of readers and extend the knowledge about qualitative differences in reader growth.

METHOD

The project was designed to generate a measure of context usage in readers who had been categorized as good and poor. The poor group was further categorized into *Difference* poor and *Deficit* poor readers using criteria similar to those employed by Cromer (1970). Context usage was manipulated for each of these groups by providing alternative formats within the word boundary task. These formats include:

1. Standard Word Boundary (SWB):
   in which all punctuation and capitals were eliminated from a prose passage and extra spaces were added between the letters of words.
   thehighaltitudesitishardtobreathesohighup anditisnoteasytogetfood
2. Articulatory Phrased Word Boundary (AP):
   in which the word boundary passage was chunked into phrase units, separated by double dashes. These phrases were taken from the way that it would be read by a mature reader (Cromer, 1970; Klein, Klein & Hildum, 1974).
   thehighaltitudes–itishardtobreathesohighup–anditisnoteasy–togetfood
3. Nonsence Phrased Word Boundary (NP):
   in which non-meaningful organizational chunks were made of similar length and number as AP. This is a format control for AP.
   thehighaltitudesit–ishardtobreathesohighupand–itisnoteasyto–getfood

Hypotheses

H1. *Good* readers should perform significantly better than poor readers on all word boundary tasks. This is in essence a replication of findings by Goldsmith (1975).

H2. For the *Good* readers and the *Deficit* poor readers, SWB scores should be lowest followed by NP and then AP. This expected outcome is supported both by the study of Klein and Klein (1973b) which illustrated that contextual enhancement related to oral language usage improves performance, and the work of Cromer (1970) which demonstrated that *Deficit* poor readers tend to use context in much the same manner as *Good* readers.

H3. *Difference* poor readers should benefit more from the AP format than the *Deficit* poor readers. This hypothesis follows from Cromer's (1970) study showing similar results, and work by Levin (1974) who found that such "inducement" of comprehension through exercising visualization (a form of self-generated context) helped *Difference* readers, but not *Deficit*.

Subjects

One hundred-thirty-three racially and socially mixed seventh grade students from 10 regular and reading improvement classes in 5 school districts in and around an Ohio Valley metropolitan area were screened for participation in this study. The students ranged in total reading achievement scores from 2.5 grade level to 11.0+ grade levels. Seventh grade was chosen, as it seemed to be the center of context usage development as documented by Klein, Klein, and Bertino (1974) and therefore, ideal for the parameters of the study.

Subjects were selected and assigned to good and poor cells based on their total achievement scores on a standardized test which had been administered several months before. Good readers (*M* reading achievement 7.3) had total reading scores of ≥ 6.0 (N=78), while poor readers were achieving at ≤ 5.5 (N=55). Poor readers (*M* reading achievement 4.5) were sorted into *Difference* (N=38) and *Deficit* (N=17), classifications based on the relationship between their comprehension and vocabulary subscores on the same standardized test. Both subgroups of poor readers had mean total reading achievement levels of 4.5, but *Difference* poor readers had vocabulary scores in excess of their comprehension scores while the reverse was true for the *Deficit* group. The latter could apparently comprehend beyond their measured vocabulary.

Materials

A total of 12 passages, each of approximately 100 words in length, were chosen from those used by Bormuth (1969). These covered the areas of history, government science, and literature in an attempt to neutralize the effects of interest in the data as much as possible (Goldsmith, 1977). The passages were assigned grade levels from 2 through 10 using the *Rauding Scale of Prose Difficulty* (Carver, 1976).

Procedures

Each passage was prepared into the three word boundary formats. The passages and formats were counterbalanced between *Good, Deficit* poor, and *Difference* poor groups and arranged into packets such that subjects read each of the 12 passages, but for each subject four were SWB, four NP, and four AP.

The subjects were tested in groups of 10 to 32. The testing sessions lasted approximately one hour. After a period in which they were given practice in the word boundary tasks, the subjects were tested on each of 12 passages. They were given 75 seconds on each passage to "Put slashes (/) between the words, so that when you are finished, you can read the passage." The time limit was kept brief so that all subjects would be challenged for the entire testing period.

Data Analysis

Word marking efficiency scores were derived in the following manner: First, the total number of passage word identifications attempted during the time period (TA), the total number of word boundaries marked in error (ME), and the total number of word boundaries up to TA left unmarked (UM) were computed for each subject; second, ME and UM scores were then added together to determine the total number of error (TE); and finally, TA less TE yielded the word marking efficiency scores used in the analysis. As anticipated, no subject missed significantly enough in TE to come in any way close to missing more than were possible, though totally random markings could have had such a result. This supported the conviction that the subjects were engaged in appropriate word identification throughout.

The data was analyzed by generating means and standard deviations for word marking efficiency on passages and comparing them between groups using ANOVA and graphic representations of the data. The design which included replications of several earlier studies, was a within subject design, each person being measured four times within each word boundary format. The data was first collapsed across all passages to allow for group comparisons relative to the original hypotheses.

The data for only the four lowest readability passages were then collapsed and analyzed (*M* readability=3.3). This last procedure was designed to document reader differences in material that was manageable by most of the subjects. This phenomenon was disguised when all passages were used.

RESULTS

Results of the study are shown in Table I. Standard deviations varied from 16% to 35% of the means indicating a large variance in word boundary functioning within the groups. This could be attributed to the abbreviated testing times and to passage peculiarities which could interact with processing rate. Table I depicts the separation of the three reader groups on all twelve passages, and the same groups on four passages with readability levels of four and below.

TABLE 1

Word Identification Efficiency (Means for 75 Sec.) for
Good, Deficit Poor, and Difference Poor Readers in Three Word Boundary Formats
(Standard Deviations Given in Parentheses)

	FORMATS		
	SWB	NP	AP
		ALL PASSAGES (READABILITY M=6.5)	
GOOD	54.1 (12.8)	56.0 (14.1)	57.5 (8.1)
DEFICIT POOR	38.8 (8.7)	38.6 (10.0)	39.7 (7.3)
DIFFERENCE POOR	37.4 (8.2)	40.7 (10.8)	41.5 (4.9)
		EASY PASSAGES (READABILITY M=3.3)	
GOOD	41.2 (18.1)	43.2 (18.7)	48.4 (13.9)
DEFICIT POOR	30.9 (12.6)	30.1 (10.4)	36.2 (9.7)
DIFFERENCE POOR	25.2 (7.9)	31.3 (13.8)	31.1 (13.5)

H1 was supported. *Good* readers did do better than poor, $F(2,128)=24.65, p< .001$, as was anticipated from the work of Goldsmith (1975). Context usage appears to increase differentially within age groups as well as between grade levels.

H2 was partially supported, $F(2,260)=6.00, p< .005$. The *Good* readers and the *Deficit* poor readers both had SWB < AP in each set of analyses. However, *Deficit* poor reader performance has been adversely affected by NP with both passage groupings. This agrees with Klein, Klein, and Hildum (1974) who suggest that competent context users (Deficits) could be confused by chunking which groups parts of two "sensible" contextual units. Both groups were also capable of taking full advantage of the context enrichment provided by AP. Note their parallel increases NP to AP on each set of materials.

H3 was rejected. For all passages, the groups are too close together to draw any conclusions, though the *Difference* readers did end up lower than the *Deficit* poor readers on AP. For the easy passages, however, the interaction between format and poor reader types is clear. *Deficit* poor readers were significantly higher on SWB passages than *Difference* readers were, $t(53)=2.50$, $p < .05$. A similar trend was evident in the AP passages, $t(53)=1.62$, $p < .10$). These particular data, however, are contrary to the hypothesis. It was anticipated that while both poor reader groups could benefit NP to AP, that the *Difference* readers would be more greatly enhanced, due to the provision of built-in-context cues which these relatively strong vocabulary readers normally do not use. *Difference* readers were in reality, however, indistinguishable in their NP and AP performances. Rather than show how context enrichment can help, the data show that *Difference* readers with their "word identification set" (Steiner, Wiener, and Cromer 1971) defy all the attempts to aid them. They continue to misuse, or ignore the contextual processing cues provided.

DISCUSSION

There are three notable aspects of this research which can be carried on to a next level of investigation. First, this study strengthens the connection between oral language and cues to silent reading efficiency even for good readers. Second, readability, was unrelated to word boundary performance for all of the passages in the study. Low readability does seem to interact with word boundary performance, however. This is obvious as the slopes for all passages are relatively flat, indicating a washout of format effect in a wide range of passage difficulties. In the easy passages, the slopes, particularly NP to AP, are much steeper. This could be expected for poor readers, but it was also true for *Good* readers. The easier the passages, it seems the more fully context can be used to identify the passage words.

Finally, and the most importantly, *Difference* poor readers and *Deficit* poor readers are distinguishable in context usage in manageable passages. This does support the Wiener-Cromer notion of different kinds of language bases for poor reader performances.

One can now more confidently demand appropriate distinctions in poor readers to be made in research. In addition, the field can continue to generate remedial procedures to account for this new understanding of poor reading. This instructional question is particularly important in view of the clear majority status of the *Difference* readers in the present population. The usual remedial and LD programs treat all poor readers as *Deficit* poor, in need of word identification skills primarily.

While some few answers were generated in this study, more intriguing are the questions which can now be raised regarding language and reading. For example: Are *Difference* readers also *Difference Listeners?* Can good readers who are not yet mature readers be differentiated with Wiener-Cromer characteristics? Why were there so few *Deficit* readers in a population of such a varying nature?

A corollary of all of these questions is: Are *Difference* readers born, or are they created in primary instruction which is predominantly word oriented?

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THE DIFFERENTIAL ROLE OF FUNCTION WORDS AND LEXICAL ITEMS IN NARRATIVE AND EXPOSITORY TEXT

Research has shown that although cloze can be used as a measure of readability and of reading comprehension at the high school and college levels (Bormuth, 1967; Rankin, 1971), cloze performance is affected by other factors such as content and deletion pattern. Several studies have found significant differences among different content area passages (McNinch, Kazelskis & Cox, 1974; Miller & French, 1974; Cohen, 1975). McNinch, et al. (1974) reported a significant interaction between deletion pattern (every fifth, seventh, and ninth) and content (English, history, math and science) on cloze performance of college freshman. Miller and French (1974), using cloze as the measure of comprehension, failed to find this interaction. However, they did find that science passages were significantly more difficult to comprehend than social science passages for high school seniors.

The results of these studies lead to several conclusions to be considered in future research. First, performance on cloze passages in different content areas varies. Second, there is some evidence to suggest that content and deletion pattern interact. These studies have only defined content as subject matter and have based deletion patterns on a ratio model. Yet, content area writing consists of both subject matter and the form or style through which the concepts are conveyed. There is also some evidence that linguistic units (lexical and function words) are used for specific purposes in different styles (Applebee, 1978; Sager, 1977). An investigation of the relation between style (narrative or expository) and the use of specific linguistic deletion patterns is needed to further understanding of differential cloze performance on content materials.

A great proportion of high school reading materials are written in one of two styles; expository (textbook prose) or narrative style (literary prose). Smith-Burke, Gingrich, and Eagleeye (1978) found that lexical items in one-fifth deletion cloze varied in difficulty across these two styles. However, the passages used in their study were not equated for readability across styles. Therefore, there is a need to examine lexical deletion patterns in passages of different styles which have been equated for readability.

Extending the work of Sager (1977), Smith-Burke, et al. (1978) also hypothesized that function words would be more difficult to replace in expository text than in narrative. Their study failed to find this interaction. However, their design which utilized a separate passage for each deletion pattern (function or one-fifth) did not permit them to compare the results of different deletion patterns on the same passages.

In the present study, the authors investigated the effect of different styles of text (narrative and expository) and deletion patterns of different linguistic elements (lexical and function) on cloze comprehension scores using two passages equated for readability.

METHOD

Instruments

The test materials were a narrative passage, taken from *1984*, and an expository passage, *The Heart Is a Busy Machine*. It is assumed that the subjects had adequate background knowledge to comprehend these passages, since neither passage contained highly specialized vocabulary. Both passages ranged from 7th- to 9th-grade reading level on two readability measures (Fry, 1968; Dale & Chall, 1948).

A lexical and a function word deletion pattern were applied to both passages as follows: If the fifth word (or multiple of 5) was of the word type necessary for the desired deletion pattern, it was deleted. If not, the next word of the desired type following the fifth word was deleted. Each deleted word was replaced by an unnumbered 10-space blank. Upon completion of this procedure, a lexical and a function word version were generated for *1984* and for *The Heart Is a Busy Machine*. These four cloze passages, with 50 deletions each, were used for testing. (The lexical version of *1984* had only 48 cloze deletions. Scores were adjusted statistically).

Procedure

Forty graduate students in educational psychology were randomly assigned to either the lexical item or the function word deletion condition. Each subject completed a narrative passage and an expository passage within one deletion pattern condition. The cloze tests were completed during one session of approximately 45 minutes.

Design of the Study

A split plot factorial design (Kirk, 1968) was used with deletion pattern as the between-group variable. Style was the repeated within-group variable and was counterbalanced for passage order.

Each protocol was scored for percentage of exact replacement of the deleted items. All two-word responses, morphological variations, and omissions were scored incorrect.

RESULTS AND DISCUSSION

In a 2 × 2 (Deletion X Style) analysis of variance, a significant main effect was found for deletion pattern, $F(1, 38) = 157.687$, $p < .001$, accounting for 65% of the total variance. A significant main effect for style of text, $F(1, 38) = 86.019$, $p < .001$, accounted for 9% of the total variance.

Although the main effects were significant, the results of the study must be interpreted in light of the significant interaction between deletion pattern and style of text, $F(1, 38) = 58{,}031$, $p < .001$. Six percent of the total variance can be attributed to this interaction.

A post hoc comparison of means (Tukey, LSD) revealed a significant difference between narrative and expository style for the lexical item deletion pattern, but not for the function word deletion pattern. In cloze passages, lexical or content words in narrative style prose were more difficult to replace than those in expository prose. An examination of the characteristics of the two writing styles provides one possible interpretation of these findings.

TABLE 1

Mean Percent of Correct Responses on Narrative and Expository Passages with Lexical Item or Function Word Deletions

	Deletion			
	Lexical		Function	
Style	M	SD	M	SD
Narrative	27.35	8.84	72.50	11.24
Expository	50.80	9.66	74.80	7.96

N=40

Applebee (1978) distinguishes between subjective thought usually expressed in the "poetic" mode through forms such as narrative, poetry, or drama, and objective thought usually expressed in the "formal" mode through forms such as exposition, essay, or argument. Burke (1966) further argues that in the poetic mode the author creates a set of "personal equations" interpreting experience in his/her own subjective manner. In the poetic mode one stylistic device is the use of synonymous words or phrases to express one thought. For example, in *1984* the "message" which Winston received was also referred to as "handwriting," "words," and "whatever was written on the paper." In this way, the author allows the reader to generate several associations to the concept, embellishing and elaborating it. This collocative (Halliday and Hasan, 1976) use of synonymous terms provides one explanation for the difficulty in replacing the *exact* cloze item in narrative style.

In contrast, in the formal mode the aim of the author is to be as consistent and explicit as possible, constraining the possible associations that the reader might make, as well as constraining the core of lexical items related to the passage. For example, in *The Heart Is a Busy Machine* the word "blood" appeared eight times and the word "heart," ten. The use of consistent terminology leads to the high frequency of occurrence of certain specific concept words. Therefore, the probability of such words being deleted and the probability of the reader's successful replacement of such items are increased.

In the passage on the heart, 50% of the occurrences of "heart" (5) and of "blood" (4) were cloze items, comprising 18% of the total score. The mean percent of correct replacement for all occurrences of "heart" was 93% and the mean for "blood" was 79%. This phenomenon may account for the greatly increased score on lexical items in expository style.

There was no significant difference between styles for the function word deletion pattern. This non-significant result may be due to the fact that mean scores on the function word versions were approximately 75%, which may represent a ceiling effect. In contrast to this result, Smith-Burke, et al. (1978) found that in one-fifth cloze, the function words were significantly more difficult to replace in expository style than in narrative style. In light of these contradictory findings, further research should attempt to specify the role of function words in various styles of prose.

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SEMANTIC SALIENCE IN RELATION TO WORD KNOWNNESS

Parents, teachers, and researchers are concerned about the knowledge that children bring to school with them and about how schooling affects that knowledge. Much of this knowledge is metalinguistic in nature. Children bring developing concepts about linguistic units to school with them. What kinds of notions do children have about words, about letters, about sounds, about stories? How do these notions affect their success in school? In recent years, these questions have been concerning a number of reading researchers, particularly about the metalinguistic concept "word". (Downing & Oliver, 1974; Ehri, 1975, 1976, 1977; Holden & MacGinitie, 1971; Mickish, 1974; Karpova, 1955; Papandropoulou & Sinclair, 1974; Stein, 1978; Sulzby, 1978, and Tovey, 1976).

Studying language development in young children poses some methodological problems. Researchers interested in developmental trends and how these trends are affected by schooling have been directing attention to the nature of stimulus materials used with children. A number of researchers (Brown, 1975; Hall & Ware, 1968; Perfetti & Hogaboam, 1975; Richmond, Nida & Pittman, 1976; Stein & Goldman, 1978; and Sulzby, 1978) have used or suggested various means to be certain that the stimulus materials used are equated on variables relevant to the children in the experiment. In Sulzby (1978) children were asked to rate words used in the study as either Known or Unknown. Thus the variable Knownness, as judged by the ability to identify the word and give a gist of meaning for the word, could be manipulated in an investigation of children's concept of "word."

The study reported here investigated further how the metalinguistic unit "word" becomes primarily a unit of semantic salience to school children, rather than primarily a unit in which structure (letters and/or sounds) is the salient aspect. Sulzby (1978) used a word choice paradigm in which children were asked to explain how words previously rated as known or unknown "go together for you." Words were presented in oral form or in written form. Thus, she investigated how presentation mode (oral or written) and knownness (known or unknown) affect children's developing concept for words. Knownness was split into two variables for analysis of potentially different effects of the choice words or the question word given to the child.

The child's explanation of how the two chosen words, "go together for you," was scored as either semantic or non-semantic. Children's responses fall into the semantic-structural dichotomy familiar in the verbal learning and associative literature (Bach & Underwood, 1970; Hall & Halperin, 1971). Children could give structural (letter and/or sound) responses about any set of words but no structural patterns were built-in by the experimenter as they have been in studies concerned with the acoustic-semantic shift. Thus the findings relate only indirectly to the study of encoding features or acoustic-semantic shift. It should also be noted that the words used were nouns, the form class within which the so-called paradigmatic-syntagmatic shift is most evidenced (see Nelson, 1977), including the shift from "clang," or acoustically-oriented responses, to the paradigmatic, or same form class, associations.

The variable of interest here was the children's semantic responses and the relationship between written and oral presentations. Memory was not of interest and children were allowed to keep the written words in view and to have the oral words repeated until they had given their explanations, thus obviating the comparison with old-new judgments in the memory encoding literature. The focus of the study was further investigation of the increasing tendency for children to give semantic responses as they progress in school, even for unknown words, when other responses are available and, seemingly, easier.

The non-semantic responses were structural in nature, as they are in the acoustic-semantic shift literature and in the associative literature. Those studies have not dealt with the impact of children's learning graphic symbols and graphic-phonemic relationships upon children's responses. In those studies children's responses have usually been called phonemic or acoustic; however, many of the so-called semantic distractors also have graphic and often phonemic similarities. In this study, the child determined the relationship and a "structural" response could involve graphic judgments like, "They both got letters," or "They have letters that stick down."

Sulzby (1978) found that the expected increasing tendency to give semantic responses extended even to unknown words. To give such a response, the child must actually invent a potential or hypothetical meaning. It is speculated that the child's ability to focus on potential meaning would have great utility for a maturing reader who wishes to read rapidly and not spend time ascertaining the "correct" meaning for every word in text. This tendency probably underlies the strategy that we call "the use of context." The current study compares semantic responding to unknown as well as known words both in written language and in oral language.

In Sulzby (1978) words were rated only in the written presentation mode and it was assumed that children would know the word in its oral form. Results of the previous study and results reported herein indicate this assumption is at least questionable for some populations. Generally, for younger children at least, it is assumed that oral vocabulary develops in advance of written vocabulary. Thus it was reasoned that children would offer semantic explanations for words presented orally more frequently than for words presented in written form. In the earlier study, this assumption was substantiated by significant main effects for presentation mode; however, there were significant interactions with grade. The older children offered semantic explanations for words presented in written form as frequently as for words presented in oral form. The present study replicated the earlier study by using the knownness rating in the oral mode in addition to the written mode.

Besides the three within-subjects variables of presentation mode, knownness of the question word, and knownness of the choice word, the present study manipulated grade level, but this time with a sample from a population different in socioeconomic characteristics, in achievement and ability levels and in method of instruction.

METHOD

Subjects

Twenty-eight white upper middle-class children each from grades one, three, and five were chosen at random from an elementary school in a suburban school district north of Chicago, Illinois. In this school system the method of teaching reading stressed decoding, but not to the exclusion of other methods. Achievement and ability scores in the school and district averaged above national norms.

Procedure and Design

Each child took part in two tasks: A knownness rating in which his or her words were selected and a word choice task in which the child explained how chosen words went together for him or her. The words for the knownness rating came from word lists of nouns chosen at random from four sources: *Harris & Jacobson Core Words for First Grade* (Harris & Jacobson, 1973); *Clarence R. Stone's Revision of the Dale List of 769 Easy Words* (Spache, 1968); *The Teacher's Word Book of 30,000 Words* (Thorndike & Lorge, 1944); and the preprimers used in the school district. *The American Heritage Dictionary of the English Language* (1975) was used to determine that the most common usage of the randomly selected word was noun. Words were arranged in lists according to frequency of occurrence to aid the children in selection. Two lists had been composed at each level for Sulzby (1978); one was used for oral and the second for written knownness ratings, and, hence, for the word choice tasks. From the lists each child rated 18 words as known and 18 words as unknown to him/her in oral form and a second list of 18 known and 18 unknown words in written form. The children needed lists 2-4 levels less frequent (hence, more difficult) for the oral rating than for the written rating. The knownness ratings were conducted a day prior to the word choice task, which was the actual experimental task from which the dependent measure was taken.

In the knownness rating examiners scored a word known (K) if the child pronounced the word correctly (within the child's speech patterns) and if the child gave a gist of meaning for it appropriate to the community. The 72 words from the knownness rating were cast into four knownness configurations for the word choice task. The four knownness configurations were used to study the effects of the child's knowing all of the words (K-KK); knowing none of the words (U-UU); knowing either his/her word, the question word (K-UU); or knowing only the examiner's words, the choice words (U-KK), in an X:XA, XB choice paradigm. The four knownness configurations (K-KK, K-UU, U-KK, U-UU) and the two presentation modes (written and oral) were counterbalanced and assigned to subjects at random in the Word Choice task.

The dependent measure was the number of semantic explanations of choices in the word choice task. Children were asked to explain: "How does your word (the question word) go with my word (the choice word) for you?" Prior to the experimental task, the examiner used a sample triad, eliciting or modelling answers that were both semantic and structural in nature, high level as well as trivial. Responses and probes were recorded on individual protocols. Content analysis and inter-rater reliabilities indicated that the intention of the responses could be reliably scored. Two independent raters scored each protocol. Although Pearson product-moment correlations indicated a high degree of agreement initially, disagreements were resolved by a third rater.

Independent variables were grade level, knownness of the question word, knownness of the choice word, and mode of presentation. Protocols were used for descriptive analysis of metalanguage, as well as for the statistical analysis. Results of the statistical analysis will be presented here; results of the descriptive analysis will be presented in combination with those of Sulzby (1978) in a longer forthcoming paper.

RESULTS

In a four-way repeated measures analysis of variance, children were found to give significantly more semantic responses if either the question word, $F(1,81)=95.37$, $p<.001$, or the choice word, $F(1,81)=51.96$, $p<.001$, were known or if the word were in the oral rather than the written mode, $F(1,81)=20.11$, $p<.001$. Contrary to the results of Sulzby (1978) (Sulzby (1978) was re-scored to count only semantic responses; the results were essentially the same.) the main effect for grade level was also significant, $F(2,81)=7.83$, $p<.001$. No interactions were significant and a visual inspection of the means showed a steady increase with grade level for all comparisons with a clear distinction between oral and written modes, with oral means consistently higher than written means. Means also consistently increased according to the knownness conditions within the configurations.

DISCUSSION

In the present study, the oral mode continued to elicit more semantic responses than the written mode even in the fifth grade. The statistical analysis gives evidence of an increase in oral semantic responding that parallels yet remains higher than the semantic responding to written words. In Sulzby (1978), however, semantic responding to written words increased at a faster rate than semantic responding to oral words, as evidenced by graphs of the interactions between grade, knownness, and presentation mode. The descriptive protocol analyses indicate that the word in oral presentation mode seemed to have more stability for the upper-middle-class children than it seemed to have for the rural lower and lower middle-class children.

Knownness of both the question and the choice word continued to affect children's semantic responding significantly; children gave more semantic responses if they knew the word than if they did not. There was a steady increase in responding semantically even for all unknown words (U-UU) and for the configurations in which one or two words were unknown (K-UU and U-KK).

It is the increase in children's expectation that even unknown words require semantic responses that is of interest in both studies. Even when children could easily give a structural response or when they could refuse to respond, children showed an increasing preference to give a semantic explanation and created hypothetical meanings and contexts for unknown words. This was in agreement with the results of Sulzby (1978). It was speculated that the ability to invent a potential or hypothetical meaning would have utility for a maturing reader who wishes to read rapidly without stopping to check for precise "meanings" of unknown words in oral language as well as in written language.

The results from Sulzby (1978) cannot be interpreted unambiguously because the words were rated only in the written mode. From the indirect evidence of the study and from the proportionate fall in ability and achievement scores, it appears that the population characteristics sampled from in Virginia and in Illinois differ in relation to the developing concept that the word is primarily a semantic unit.

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BEGINNING READERS' RECOGNITION OF TAUGHT WORDS IN VARIOUS CONTEXTUAL SETTINGS

The use of pictures and sentence context in teaching word recognition has been the focus of much controversy among reading authorities (Samuels, 1975; Singer, Samuels & Spiroff, 1973-1974; Goodman, 1965). Two research studies (Wood, 1976; Brown, 1978) focused on the problem of the comparative effects of three different methods of teaching new words to beginning readers; presenting the word in isolation, presenting the word along with a picture, and presenting a word in sentence context.

Two reading theories represent the extremes of the controversy: Samuels' focal attention hypothesis (Singer et al., 1973-1974) and Goodman's contextual hypothesis (Goodman, 1970). Samuels maintains that although pictures and context can help cue a correct response to a printed word, they can also serve to distract the reader's attention. This distraction may prevent the reader from focusing on the word to be learned and "he (the reader) may not acquire appropriate responses to the graphic features of the word itself" (Singer et al., 1973-1974, p. 558).

Goodman (1970) proposes that within sentences there are syntactic and semantic cues which children can use to help them anticipate unknown words. If words are presented out of this context, the reader is unable to use all of his language competence in the reading task, but is forced to rely only on the visual cues within the word itself.

For several reasons, research studies examining different methods of teaching new words provide insufficient information to resolve the controversy. First, existing studies (Braun, 1969; Samuels, 1967; Harris, 1967; and Singer et al., 1973-1974) have used as the dependent variable to measure quantity of learning, a task (recognition of words in isolation) that was exactly the same as one of the teaching conditions (teaching words in isolation) and have perhaps biased results in favor of that teaching condition. Second, several studies utilized, inappropriately, separate univariate analyses of variance to test more than one hypothesis in the same study (Samuels, 1967; and Singer et al., 1973-1974). This procedure increases the probability of having at least one of the tests produce a significant result when in fact nothing but chance variation accounts for the results (Harris, 1975). Third, existent studies (Braun, 1969; Samuels, 1967; Harris, 1967; and Singer et al., 1973-174) have not included, as a dependent variable, a reading task that would reveal how subjects, after being taught a number of words, would read these words in a natural reading situation.

STUDY 1

Wood (1976) designed a study to investigate the use of words in isolation, words with pictures, and words in sentence context in teaching new words to beginning readers. Learning in this study was assessed on five dependent variables, trials to criterion, word in isolation test, word with picture test, word in sentence context test, and word in story context. The study was designed to explore the following questions:

1. Do pictures and sentence context serve as distracting stimuli that divert the reader's attention from the critical cue, the word to be learned, as suggested in Samuels' focal attention hypothesis?
2. Is teaching words in a sentence context a more effective method, as it provides the beginning reader an opportunity to use the syntactic and semantic cues within his language to narrow the possibilities of what an unknown word may be, as suggested by Goodman's contextual hypothesis?
3. Do subjects taught by one method of teaching word recognition perform differently on different kinds of tests or do they perform better on a test that is the same as the teaching task?
4. Does the effectiveness of different methods of teaching word recognition vary between sexes?

Subjects and Design

Two hundred fifty first grade children were randomly selected and pretested on the eight target words in order to eliminate children who knew five or more of the words. The final sample consisted of 54 boys and 54 girls. These 108 subjects were randomly assigned to the three treatment groups; word in isolation, word with picture, and word in sentence context.

Data were collected during November and December, 1975. Each subject was taught individually using one of the three methods. The teaching materials were 5" x 8" index cards on which the words and sentences had been typed in primary type and on which the pictures had been pasted. Three sets of randomly ordered cards were used for each teaching method. Throughout the experiment, 12 seconds were allowed for a response from the subject and the procedure was terminated when all words were pronounced correctly on two consecutive trials or through a maximum of 12 trials. After the teaching procedure, each subject was given the tests. The order of testing was randomized to avoid practice effects. Subjects were asked to pronounce the words when presented in isolation, to match the words with pictures of the words and pronounce the words, to read the target words in the basal reader story from which they had been excerpted. Data utilized in the statistical analyses included the number of trials required to learn the words, and the number of target words correctly pronounced on each of the tests.

Data Analyses

A 3 (teaching method) x 2 (sex of subject) factorial design was used. A multivariate analysis of variance was employed to test the overall null hypotheses of no difference between each of the dependent variables due to methods of instruction, sex of subject, and interaction between methods and sex. The F-statistic for methods of instruction was significant at the .01 level. The resulting F-statistics for sex of subject and sex by method interaction were not significant. Significant results on the MANOVA permitted the researcher to compute univariate analyses of variance for each of the dependent variables in order to determine specific sources contributing to the rejection of the null hypothesis for treatment effects.

The univariate analyses of variance yielded significant results at the .01 level on the following dependent variables: trials to criterion, word in isolation test, word with picture test and word in sentence context test. The word in story context variable was the only dependent variable which did not yield significant differences due to method of instruction.

Scheffé-type contrasts on the differences among the means of the three treatment groups were computed in order to answer the questions listed above. Results of these contrasts for the trials to criterion variable did not support Samuels' focal attention hypothesis that pictures and sentence context distract the reader's attention. Subjects taught by either the word with picture or the word in sentence context required significantly fewer trials to learn the eight target words than subjects in the word in isolation group. The significant differences in favor of the word in sentence context method on the trials to criterion variable indicated that this method was the most effective in initial learning and therefore supported the contextual hypothesis.

When learning was measured by testing with words in isolation, subjects in the word in isolation group did not recognize significantly more words than subjects in the word with picture group. Again, pictures did not seem to serve as distracting stimuli. The Scheffé-type contrast between the word in isolation group and the word in sentence context group revealed that significantly more words were recognized by the subjects taught by the word in isolation method.

The contrasts on the word with picture criterion variable, however, did not yield similar results in favor of the focal attention hypothesis. No significant differences were found between those subjects taught by the word in isolation method and subjects taught by either the word with picture or word in sentence context methods. The only significant contrast was between the word with picture and word in sentence context treatment groups. The subjects in the word with picture group recognized significantly more words than the subjects in the word in sentence context group. Therefore, when learning target words was measured by testing the word with pictures, the results did not yield support for either the focal attention or contextual hypotheses.

On the criterion variable, word in sentence context, significant differences resulted from the contrasts between the word in isolation and the word in sentence context groups as well as between the word with picture and word in sentence context groups. The contextual hypothesis which suggests that using sentence context is the most effective method of teaching word recognition was supported.

When learning was measured by reading the target words in a story context, results of Scheffé-type contrasts revealed no significant differences among the three instructional methods. The results on this criterion variable cannot be interpreted to support either the focal attention hypothesis or the contextual hypothesis.

Results in this study indicate that subjects taught by one method of teaching word recognition perform differently on different kinds of tests depending on whether or not the test is the same as the teaching task. There did not seem to be any differences in the effectiveness of different methods according to the sex of the subjects.

STUDY 2

The results of the Wood (1976) study stimulated a replication by Brown (1978). Brown added a sixth contextual setting as a dependent variable, word in a story designed to provide contextual constraints. The additional story was written by Brown and constrained in the following ways:

1. High associative words were utilized to cue the reader in identifying the target words.
2. Contextual information preceded the onset of the target word when it first appeared in the story.
3. The story was constructed so that only the underlined target word would fit — the remaining seven target words would not be semantically appropriate.
4. The story was approximately the same length as the basal story used in the Wood (1976) study with each target word being present at least twice.

The number of subjects, procedures, and data analyses used by Wood (1976) were employed by Brown. Data were collected during November and December, 1977. Subjects were randomly assigned to three treatment groups, one group being taught using words in isolation, one group being taught using words with pictures, and the third group being taught using words in sentence context. After the teaching procedures each subject was given the tests with the order of the tests randomized to avoid practice effects. The subjects were asked to pronounce the words when presented in isolation, to match the words with pictures of the words and pronounce the words, to read the target words in the basal reader story from which they had been excerpted, and to read a story designed to have contextual constraints.

Data Analyses

The multivariate analysis of variance was employed to test the overall null hypotheses of no difference between each of the dependent variables due to methods of instruction, sex of subject, and interaction between methods and sex. The F-statistic for methods of instruction was significant at the .01 level. The resulting F-statistics for sex of subject and sex by method interaction were not significant. The univariate analyses of variance yielded significant results at the .01 level on the following dependent variables: trials to criterion and word in sentence context tests.

Preplanned Scheffé-type contrasts on the differences among the three treatment groups were computed to answer the same questions posed in the Wood study. Results of these contrasts on the trials to criterion variable did not support Samuels' focal attention hypothesis. Subjects in both the word with picture and word in sentence context groups required significantly fewer trials to learn the eight target words than subjects in the word in isolation group. Again, the significant differences in favor of the word in sentence context method on the trials to criterion variable support the contextual hypothesis. When learning was tested with words in isolation, results indicated no significant differences between the three methods. Likewise, there were no significant differences for method of instruction when subjects were tested using words with pictures. The results of these contrasts yield support for neither the focal attention hypothesis nor the contextual hypothesis.

On the criterion variable, word in sentence context, the contrast revealed significant results in favor of the word in context teaching variable. The Scheffé-type contrasts on the two story variables did not yield significant results in favor of any of the teaching methods.

DISCUSSION

One of the questions these two studies were designed to answer was: Do subjects taught by one method of teaching word recognition perform differently on different kinds of tests or do they perform better on a test that is the same as the teaching task? This question was raised because several studies designed to resolve the focal attention/contextual hypothesis controversy had appeared to establish a teach/test bias by testing for learning using the same method as one of the teaching methods (word in isolation). In order to answer this question, three contrasts had to be made: (1) Between subjects taught by the word in isolation method and the average of subjects taught by the word with picture and word in sentence context methods as measured on the word in isolation test. (2) Between subjects taught by the word with picture method and the average of subjects taught by the word in isolation and word in sentence context methods as measured on the word with picture test. (3) Between subjects taught by the word in sentence context method and the average of subjects taught by the word in isolation and word with picture methods as measured on the word in sentence context test.

Results of these contrasts, in Study 1, revealed that subjects taught by the word in isolation method performed significantly better on the word in isolation test than subjects taught by the word with picture and word in sentence context methods. In both Study 1 and Study 2 a significant contrast was also found for the difference between the sentence context group and the word in isolation and word with picture groups on the word in sentence context test. A teach/test bias was therefore found for words in isolation and words in sentence context. Further, these results confirm the possibility that previous studies which have incorporated one of the teaching methods as the only variable to measure amount of learning have biased results in favor of that teaching method.

The results of these two investigations are at variance with previous studies (Samuels, 1967; and Singer et al., 1973-1974) that have supported Samuels' focal attention hypothesis. Singer et al. (1973-1974) reported that "the addition of pictures, context, . . . makes the learner less efficient in acquiring reading responses" (p. 564). In both studies, the results on the trials to criterion variable were exactly the opposite of those reported by Singer et al. Subjects in the sentence context group required the fewest number of trials and subjects in the word in isolation group required the greatest number. Singer et al. (1973-1974) reported the fewest trials for the word in isolation group and the most trials for the sentence-no picture and sentence-picture groups.

There were, however, methodological differences between the present studies and the Singer et al. (1973-1974) study. In the studies presented here, subjects in the word with picture group were instructed to look at the picture, name the picture, find the word that matched the picture, and then pronounce the word. The procedure used by Singer et al. (1973-1974) did not require the subject to look at the picture or to look at the word since both stimuli were placed on the same card. This methodological difference may account for the divergent findings between the two studies for the word with picture method.

Methodological differences do not appear to account for the differences in the results for the sentence context method. A comparison of the sentences utilized by Singer et al. (1973-1974) and those developed and used for the present investigations reveals differences in the amount of context provided in the sentences. Although Singer et al. (1973-1974) state that "In three of the four sentences, definite syntactic and semantic constraints were available for predicting the target words. . ." (p. 564), these constraints are not very delimiting. The following are the four sentences used by Singer et al. (1973-1974):

1. "Fill the *cup**."
2. "The *cat** sleeps."
3. "The *bat** flies."
4. "The *bed** is pretty."

*(These words were printed in an artificial alphabet.)

The sentences used in the present studies were written purposefully by one of the investigators (Wood, 1976) to provide as much contextual constraint as possible for the target word. The sentences used were:

1. "The *frog* jumped into the water."
2. "A *rocket* can go very fast."
3. "We took a trip in an *airplane*."
4. "That *man* is my dad."
5. "The *moon* is in the sky at night."
6. "That nest has a *bird* in it."
7. "I can blow up a *balloon*."
8. "I like to play with my *kite*."

Obviously, the amount of contextual constraint provided in the sentences used in the investigations is not equivalent.

SUMMARY

The conclusion supporting "Samuels' focal attention hypothesis for acquiring reading responses for novel words" (Singer et al., 1973-1974, p. 566) was reexamined in two investigations using a more powerful statistical technique, a multivariate analysis of variance. This reexamination seems to indicate that the conclusions of Singer et al. (1973-1974) were somewhat unwarranted not only because they were based on questionable methodologies but also because they may have resulted from the use of inappropriate statistical analyses.

Two separate analyses of variance were computed by Singer et al. (1973-1974), one on the trials to criterion variable and one on the number of correct responses on test trials. The experiment-wise error rate seemingly was not adjusted. Harris (1975) has pointed out that when two univariate analyses are conducted when more than one dependent variable has been collected for each experimental subject, researchers perhaps increase the probability of having at least one of the tests produced significant results when in fact chance variation could have accounted for the differences.

When these beginning readers were taught new words by presenting the word in isolation, matching the word with a picture, or presenting the word in a sentence context and subsequently tested by reading the words in isolation, matching the words with pictures, reading the words in a sentence context and reading the words in two story contexts, the use of pictures and sentence context did not interfere with learning. The results of this study with these samples of children did not support Samuels' focal attention hypothesis, except on the dependent variable, words in isolation. The results on the trials to criterion variable favored the use of sentence context and clearly supported Goodman's contextual hypothesis.

Results on the two story variables, basal reader story and the investigator-designed story were not significant and, therefore, cannot be interpreted to support either hypothesis.

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MEANING ASSIGNMENT STRATEGIES OF SKILLED ADULT READERS

The purpose of this study was to discover the strategies that fluent readers use to assign meaning to difficult or unknown words in context. The study is based on two theoretical beliefs: One, that reading is an information-processing activity composed of various cognitive strategies and secondly, that context is an effective method of vocabulary acquisition and development.

Viewing reading as an information-processing activity (Goodman, 1967; Smith, 1972; Geyer & Kolers, 1974; Anderson, 1977; Spiro, 1977) results in an emphasis on process research rather than structure research. Process research strives to examine the reader's behavior and strategies *during* the reading process rather than after. Much of the background and methodology for research emphasizing process has come from the problem solving studies of Newell and Simon (1972).

The second theoretical belief that context is an effective, although gradual, method of vocabulary development is a well-established traditional position (Thorndike, 1917; McCullough, 1943; Werner & Kaplan, 1950; Deighton, 1959; and Strang, 1967). However, some research (Grey & Holmes, 1938; Gibbons, 1940; Sachs, 1943) indicates that readers do not know how to use context. Petty, Herold and Stoll (1968) suggest that context studies have not been particularly productive for two reasons, that context clues have been superficially presented, and that students have not been encouraged to use their knowledge of the language. To encourage the use of language knowledge, this study uses real words, rather than nonsense words or blanks, and places those real words in a paragraph context to allow the use of available inter-sentence information.

METHOD

Materials

Eleven paragraphs from William F. Buckley, Jr.'s spy novel *Saving the Queen* were typed double-spaced on 8½" x 11" paper, one paragraph to each sheet. The selection of the paragraph was based on the presence of a difficult word. The words were judged as difficult by two skilled readers: one, a college graduate who was 39 years old and an avid reader and secondly by the experimenter. Some words of medium difficulty were also chosen by the experimenter to ensure a broad range of difficulty. An analysis of the words according to the *American Heritage Word Frequency Book* (Carroll, Davies, & Richman, 1971) indicated that the frequency of the words in that corpus of over five million words was as follows: *prototype* (9), *antiphonal* (6), *placate* (3), *elucidation* (1), *eschewed* (1), and the remaining six, *lacunae, obduracy, penumbral, porcine, sycophancy,* and *troglodytic* did not occur.

Subjects

The subjects were two skilled college-level readers. The female subject was

73

35 years old and had attended one year of college. She was a part-time secretary, housewife and mother, and active in a best-seller book discussion club. The male subject was 48 years old, a college graduate and a company comptroller for a large merchandising firm in Minneapolis.

Procedures

The subjects were introduced to the study with the instruction: "I am interested in how skilled readers deal with unknown or unfamiliar words. As you are reading, try to think of the strategies you are using to help yourself comprehend the word in particular and the paragraph in general." A tape recorder was used to tape the interview. The paragraphs were presented to the reader, one at a time. After the reader had read a paragraph, he was asked to assign meaning to the target word. The following set of probe questions was used to elicit necessary information not volunteered by the reader.

1. Do you have a general idea of what the paragraph is about?
2. Look for the word, i.e., *porcine*.
3. Do you know the meaning of that word? Can you ascribe any meaning to it?
4. What does the sentence mean to you?
5. How did you go about assigning meaning to that word? What did you do?

Additional questions were asked as appropriate. This same procedure was repeated in a follow-up session approximately one year later. At that time a multiple-choice synonym test on the difficult words was also administered.

RESULTS

Linda's Strategies

The strategies that Linda used fell into three main categories: paragraph restatement (which is essentially an avoidance strategy), syntactic analysis, and visual or auditory word part analysis (see Table 1).

The approach used most often by Linda was that of paragraph restatement (55%) or avoidance. In general this approach indicates an undeveloped approach to specific word meaning as the approach does not require differentiation between the word itself and the context of the word.

One of the words that Linda used this strategy of paragraph restatement with was *eschewed*. *Eschewed* means to avoid or to shun, but Linda did not mention the word or any of its syntactic, semantic or orthographic features when asked for its meaning. Rather, when Linda was asked, "What does the word *eschewed* mean to you?" Linda took a deep breath and plunged into a paragraph summary stating what was happening.

> All right, Comrade Stalin had not conglomerated this thing. . . thought up this little trip as means of killing off another person, in other words it wasn't a death ride, he didn't think up this little thing, this little expedition.

Despite attempts to get Linda to respond directly to the word, she persisted in the paragraph restatement strategy.

Linda used the second category of syntactic analysis with only two words or 18%. The criterion for placement in this category was an expressed utilization of the grammatical position of the word in the sentence. For instance, a grammatically correct (though semantically incorrect) definition was offered

74

with no hesitation for the word *lacunae*, even to the point of replacing it in context, as "the order of our work, the depth of our work, the reasoning." The substitutions of *order, depth,* and *reasoning* are all grammatically correct, though semantically incorrect.

The third approach, that of using visual or auditory word part analysis, is a more advanced approach in that there is a definite concept of dealing with the word as a unit rather than as embedded within a sentence unit. Within this approach there is a continuum, of course, from the successful "breaking down" of *antiphonal* into *anti-* and *phonal*, and the misleading auditory analysis "psycho" from *sycophancy*. This approach was used 27% of the time. Linda's strategies in the follow-up session will be discussed later.

Bob's Strategies

Bob's strategies for assigning meaning included the three strategies used by Linda plus two new strategies (see Table 2).

Bob, as did Linda, used the paragraph restatement approach, but only with three words or 27%. It should be noted that both subjects appeared to favor this strategy as a backup when a more specific approach was not readily available to them.

The two new strategies used by Bob were recall and definition. The largest percentage (37%) of Bob's responses were definitional. This resulted from the fact that Bob actually was quite familiar with these words. On the four words for which Bob offered definitions, his manner and directness clearly indicated his self-confidence and self-assurance of his accuracy. For example, when asked for the meaning of *elucidation* he replied without hesitation, "to describe in more detail."

The recall strategy was only used once by Bob, but may represent an important approach to the development of word meaning. As Bob tried to assign meaning to the word *eschew* he said, "I'm not trying to relate it to the paragraph, but recall it by memory." When asked the reason why he would use that strategy, he replied, "Well, it's quite a familiar word, but not that clear."

After the recorder was turned off, Bob recalled why he felt familiar with the word *eschewed*. He said that he had formerly memorized a passage from Shakespeare that contained that word. With that additional information, it is tempting to conclude that recall of meaning was elusive due to the unusual type of categorization storage, i.e., it was the word in context that was stored rather than the individual word.

FOLLOW-UP RESULTS

Bob's responses show a definite pattern of growth with these specific words over a year's time (See Table 2 again).

Note that all three words from the paragraph restatement or avoidance strategy moved to a more advanced category.

The two new words in the recall category resulted from a slight confusion of memory. Bob remembered looking *penumbral* up specifically, and said that it was an "insect" word. Later, however, upon encountering *troglodytic*, Bob reversed himself and said that *troglodytic* was the "insect" word.

TABLE 1

Linda's Strategies (July, 1977)

Paragraph Restatement		Syntactic	Word Part Analysis
Total Words in Category 6 (55%)		2 (18%)	3 (37%)
elucidation	troglodytic	placate	penumbral
eschewed	prototype	lacunae	antiphonal
obduracy	porcine		sycophancy

Linda's Strategies (September, 1978)

Paragraph Restatement	Syntactic	Word Part Analysis	
Total Words in Category 2 (18%)	3 (27%)	6 (55%)	
elucidation (X) •	lacunae (X)	penumbral (X)	troglodytic (X)
porcine (X)	obduracy (X)	antiphonal (X)	placate (C)
	eschewed (X)	sycophancy (X)	prototype (C)

*An X in parentheses means the subject made an incorrect choice on the multiple choice test item for this word, a C means the subject made the correct choice on the multiple choice test item for this word.

TABLE 2

Bob's Strategies (June, 1977)

Paragraph Restatement	Syntactic	Word Part	Recall	Definition
Total Words in Category				
3 (27%)	2 (18%)	1 (09%)	1 (09%)	4 (36%)
obduracy	lacunae	antiphonal	eschewed	elucidation
porcine	troglodytic			placate
penumbral				sycophancy
				prototype

Bob's Strategies (July, 1978)

Paragraph Restatement	Syntactic	Word Part	Recall	Definition
Total Words in Category				
0	2 (18%)	0	2 (18%)	7 (64%)
	lacunae (X)*		penumbral (C)	elucidation (C)
	obduracy (X)		troglodytic (C)	placate (C)
				sycophancy (C)
				prototype (C)
				eschewed (X)
				porcine (C)
				antiphonal (C)

*An X in parentheses means the subject made an incorrect choice on the multiple choice test item for this word, a C means the subject made the correct choice on the multiple choice test item for this word.

In examining Linda's growth over a year's time, three major facts emerge. First, there is the same general movement of words moving out of the avoidance or paragraph restatement category which represents the least sophisticated approach to dealing with unknown words. Second, only two words, *elucidation* and *porcine*, remain in the restatement category. The third fact is that while the word part category has increased to six, the three words that were originally there, *penumbral, antiphonal*, and *sycophancy* are still there. In addition, despite an acknowledged familiarity with *prototype*, Linda was unable to provide a definition. Note, however, that Linda was able to choose the correct synonym for *prototype* on the multiple-choice test. The only other word that Linda was able to answer correctly on the multiple-choice test was *placate*.

CONCLUSIONS

Although this study is clearly exploratory, it has tentatively identified four strategies that skilled readers use in dealing with unknown words. Those four strategies are paragraph restatement, syntactic analysis, word part analysis, and recall. A fifth type of response, that of definition, occurs when a skilled reader knows the difficult word. Finally, the follow-up study indicated a general movement of words over a period of one year from the paragraph restatement category to categories requiring more specific awareness of individual words.

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DIFFERENTIAL RELATIONSHIPS OF TWO VERSIONS OF CLOZE TESTS TO VOCABULARY AND READING COMPREHENSION

Most research using the cloze procedure has used a standard sized blank to replace the deleted word, which is the procedure originally recommended by Taylor (1953). Using a line of standard length eliminates any word-length clues to what word should go in the blank space. However, several studies have experimented with the idea of giving the subject some clue to the length of the word which goes in the blank space. Anderson (1971) and Spooncer (1974) have used lines proportional to the size of the deleted word, rather than the standard length line, but have found no significant differences between the scores when using the two versions. Rush and Klare (1978) experimented with three forms of a cloze test, the standard length line, a line proportional to the length of the deleted word, and a dashed line, where the number of dashes equalled the number of letters in the deleted word. They found that the percentage correct on the proportional line form was not significantly different from that on the standard line form, but that the dashed line form yielded a significantly higher mean percentage score than either of the other two forms. Entin and Klare (1978) also found that the mean percentage correct on the dashed line form was significantly higher than the mean for the standard length cloze blank.

One question addressed in this study was how the dashed line cloze form affected the correlation between cloze scores and other measures of comprehension. Generally speaking, the correlations between cloze scores and other measures of comprehension have been moderate to high (c.f., Klare, Sinaiko, & Stolurow, 1972; Rankin, 1965). However, one criticism of the cloze test is that it is too much a measure of vocabulary strength, and so part of the purpose of this study was to relate both the standard and the dashed line cloze form to a measure of vocabulary.

Two different experiments were conducted to look at the relationships between cloze scores and measures of comprehension and vocabulary strength. In the first experiment, one group of subjects worked on the standard cloze form and a second group of subjects worked on the dashed line cloze form. In the second experiment, each subject did both the standard and the dashed line cloze, and the subjects' scores on each type of cloze were related both to comprehension and vocabulary. Another thrust of this second experiment was to look at the subjects' preferences for both types of cloze forms.

METHOD

Materials

The passages used to form the cloze tests were taken from part II of Form A of the *Nelson-Denny Reading Test,* called the Comprehension Test and Reading Rate Section. The seven 200-word passages were prepared in two forms. The first form of the cloze test, the solid line form, was made by deleting every fifth word and replacing it with an underlined blank of standard length (15 type spaces). The second form, the dashed line form, was made by deleting every fifth word and replacing it with as many dashed underlines as there were letters in the deleted word. Within each of these two types of cloze tests, two different sets of deletions were used.

Comprehension and vocabulary scores for each subject were based on Form B of the *Nelson-Denny Reading Test.* This form of the test had been administered, under the standard testing procedure for that test, to all incoming freshmen at Ohio University during an orientation period given during the summer or just before the start of the school year.

Subjects

The subjects were Ohio University freshmen enrolled in introductory psychology. They received experimental points toward their grade for their participation in this study.

Procedure

In the first experiment all seven cloze passages were given to each subject, with about half the subjects getting the solid and half the dashed line form. The subjects were given two hours to do the cloze tests. In the second experiment, only four of the seven passages were used. Each subject did two solid and two dashed line cloze passages. The passages were randomized across subjects so that about half the subjects did each passage in solid line and half in dashed line form. Subjects were given one hour to complete the four passages. At the end of the hour, the subjects were asked to fill out a short questionnaire assessing which of the two forms (solid or dashed line) they preferred.

Dependent variables

In all the cloze tests, the exact-word scoring method was used. The scores on the cloze passages were summed and then divided by the total number of items in the test. Thus the dependent variables are expressed in terms of percentage correct on each form of the test.

In the first experiment, the scores on the seven passages were added together to yield one measure, either a solid or a dashed line cloze score. In the second experiment the scores on the two solid line passages were summed and the scores on the two dashed line passages done by each subject were summed to yield two measures, a solid line and a dashed line cloze score.

The comprehension and vocabulary scores were taken from the students' orientation files and were expressed as percentage rankings.

RESULTS

Experiment 1

For the 48 subjects who took the solid line cloze test, the correlation of the cloze score was .56 with vocabulary and .62 with comprehension. For the 57 subjects who took the dashed line cloze test, the correlation of the cloze test with vocabulary was .60 and with comprehension was .48. In both sets of data the correlation between comprehension and vocabulary was .62.

A stepwise regression analysis was run on the solid line and the dashed line sets of data, with the cloze score being the dependent variable and the vocabulary and comprehension scores the independent or predictor variables. For the analysis using the solid line cloze, comprehension entered as the first independent or predictor variable, and vocabulary entered as a second significant predictor. The amount of variance accounted for by the two variables together was .43. For the analysis using the dashed line cloze, vocabulary entered as the first independent or predictor variable. With vocabulary entered, comprehension was not a significant second predictor. The amount of variance accounted for by both variables together was .38.

Experiment 2

As indicated previously, the second experiment used a design in which each of the 61 subjects took both solid and dashed line cloze tests. In this experiment, the solid line cloze score correlated .39 with vocabulary and .42 with comprehension. The correlation of the dashed line cloze score was .58 with vocabulary and .50 with comprehension. The correlation between the two types of cloze tests was .35. The correlation between comprehension and vocabulary was .62.

When the solid line cloze score was used as the dependent variable in a stepwise regression, the first variable to enter was comprehension. With comprehension entered, vocabulary was a nonsignificant second predictor variable. When the dashed line cloze score was used as the dependent variable in a stepwise regression, the first variable to enter was vocabulary, and comprehension was a nonsignificant second predictor. The total amount of variance accounted for by the two independent or predictor variables was .45 in the solid line and .61 in the dashed line cloze analysis.

Analysis of the preference measures used in Experiment 2 showed no clearcut preferences for either type of cloze test. Subjects who liked the dashed line form better said they preferred it because it gave them a better idea of what word should go in the blank. Subjects who liked the solid line form better said they preferred it because it gave them more freedom to select a word to put in the blank. There was no relationship between the subjects' preferences and how well they did on each type of cloze test.

DISCUSSION AND SUMMARY

The results of both experiments indicated that for the solid line cloze form, comprehension is a better predictor variable, whereas for the dashed line form, vocabulary is a better predictor variable. All the intercorrelations are moderately high and in no cases are the correlations between cloze and comprehension significantly different from the correlation between vocabulary and comprehension. However, based on the results of these two experiments, if asked to choose the single strongest predictor, one would choose a comprehension measure for predicting solid cloze scores and a vocabulary measure for predicting dashed line cloze scores.

For the dashed line cloze in both experiments, when vocabulary was entered into the regression equation, comprehension did not account for a significant portion of the remaining variance not accounted for by vocabulary. For the solid line cloze, in the first experiment when comprehension was entered as the first predictor variable in the regression equation, the vocabulary score still accounted for a significant portion of variance (i.e., was a second significant predictor). In the second experiment, however, with comprehension entered, vocabulary did not account for a significant portion of the remaining variance.

The results of the preference questionnaire indicated that there was no clearcut preference on the part of these subjects for one or the other type of cloze test. Thus one could not justify using one form over the other by appealing to a general subject preference for that type.

In summary, then, it would appear that subjects consistently get more words correct with the dashed than the solid line form. However, the fact that the dashed line cloze correlates more strongly with vocabulary than with comprehension suggests that for those cases where cloze is being used primarily as a measure of comprehension (or of comprehensibility of the passage) the traditional solid line form is to be preferred. On the other hand, for those cases where one wishes to place relatively more weight on the importance of vocabulary, the dashed line form may be preferred. Similarly if one wants to attain higher mean scores, the dashed line cloze is preferable. And, finally, neither form appears more acceptable than the other at least to college freshmen subjects.

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WORDS AND CONTEXTS

Students of reading disagree about many things, but few would deny that context plays an important role in word recognition. "Contextualism" is embraced by nearly everyone. Contextualism in reading ranges from the *methodological contextualism* of writers like Haber (1978), who would have us ignore research on isolated words and letters as irrelevant to reading, to the *radical contextualism* of theorists like Goodman (1970), who argue that context is everything in reading, in that individual words serve only to confirm hypotheses formed on the basis of prior context. All agree that context facilitates word recognition, but despite this consensus, very little is known about *how* this facilitation occurs. We hope to promote our understanding of the effect of context by offering several observations which we believe challenge the accepted views on the matter.

Local vs. Global Context. We begin by noting that there is an important distinction between two types of context, local and global. By local context we mean the immediately surrounding words, the phrase or sentence in which the word is embedded; by global context we mean the passage, chapter, story, or book where it is found. The effects of these two types of context must be different in at least one respect: the effect of local context must have an important syntactic component while the effect of global context cannot. That is, a local, sentential context like "the doctor removed the tumor from the. . ." will enhance the recognition of words with certain semantic and syntactic properties. Global context may also enhance the recognition of words in certain semantic classes, but it must be indifferent to their syntactic status. Because of this, the effect of global context must be stable, while the effect of local context must be labile. That is, the semantic effect of global context must persist across phrases and sentences, if not paragraphs and pages; the syntactic effect of local context, on the other hand, must change with each successive word. Thus any theory which holds that the effects of local and global context are mediated by a single mechanism must be wrong, and we are led to seek different mechanisms for the two effects.

Global Context. The most commonly accepted explanation of the effect of semantic context is based on the idea of *spreading activation* (Collins and Loftus, 1975). According to this idea, the meanings of words in the mental lexicon are arranged in a kind of semantic network. The recognition of a word activates a node in this network, and the activation spreads through the netword to nodes underlying related words, facilitating their recognition. Such a mechanism is thought to be operating in the lexical decision task (Meyer, Schvaneveldt, and Ruddy, 1972), where the occurence of a word like *nurse* facilitates the recognition of a related word like *doctor* occurring one or two items later.

A problem with this explanation is that related words seldom occur close to one another in text. So if spreading activation is to account for the facilitative effect of semantic context, it must be capable of reaching across a number of intervening items. To see whether it can, in Experiment I we varied the distance between pairs of related words in a list of 300 letter strings and measured the time taken by 16 adult subjects to decide whether or not each string was a word. We found that the prior occurrence of a related word facilitated word recognition only if it was within a word or two of the target; the intervention of as few as two words virtually eliminated any facilitation.

This result provides no support for the idea that the effect of global context is mediated by spreading activation, and we suggest that another explanation must be sought.

Local Context. The recognition of a word can be dramtically facilitated by prior exposure to the sentence in which it occurs (Tulving and Gold, 1963). The popular explanation of this fact is that the local context enables the reader to predict what is coming, and this prediction facilitates the recognition of the word (Goodman, 1970; Smith, 1971). But as Gibson and Levin (1975, p. 451) have pointed out, this idea has no explanatory power until we are told *what* is predicted. We consider two possibilities; neither seems to work.

At one extreme, sentential context might lead to the prediction of a specific word. The prediction of a given word is sometimes possible, and the anticipation of that word could well facilitate its recognition. But specific word predictions are seldom correct (at most one time in four, according to our estimates), and the false predictions might well interfere with recognition. Thus we were led to wonder what the net effect of specific word prediction might be.

In Experiment II we attempted to measure this effect. We asked 12 subjects to read aloud each of 75 words, and measured the latency of each response. Before each word was presented, the subject was forewarned with either the word to be presented (analogous to correct prediction), an unrelated word (false prediction), or a warning signal (no prediction). We found that correct prediction reduced word recognition latency by 29 msec, compared to no prediction, but false prediction increased latency by 12 msec. Since incorrect predictions must outnumber correct predictions by at least three to one, the net effect of predicting a single word would thus be to retard reading, and the facilitation of word recognition by sentential context cannot be explained by assuming the reader hypothesized specific words.

The hypothesis that the reader predicts, expects, or anticipates specific words is the limiting case of the more general hypothesis that local context facilitates word recognition by reducing the number of alternatives from which the correct word must be chosen (Smith, 1971). Choice reaction time is known to vary inversely with number of alternatives, and it has seemed to many (e.g., Garner, 1972) that the facilitative effect of local context could be explained by appeal to this general principle.

The problem with this idea is that a reduction in number of alternatives has little effect when the stimulus-response pairs are as highly compatible and well-learned as words (Mowbray, 1960). Therefore we have no evidence that variation in number of alternative words influences speed of recognition sufficiently to account for the effect of context.

To address this issue, in Experiment III we measured the latencies of words drawn from sets of alternatives ranging in number from one to 32. We found

84

that latency increased dramatically when the number of alternatives increased from one to two, but beyond this, variation in number of alternatives had little, if any, effect. Given that the average context reduces the number of alternative words only to 256 (Shannon, 1951), this result provides no support for the idea that the effect of local context is mediated by a reduction in the number of alternatives.

We argue, then, that there is little reason to believe that the reader's expectations, hypotheses, or predictions facilitate word recognition. If such predictions were precise enough to help, they would usually be wrong; if they were vague enough to be correct, they would not help. We conclude that we must look elsewhere to explain the facilitative effect of local context on word recognition.

Form and Context. However local and global context accomplish their effects, contextual information must at some point combine with visual information to determine the recognition of a word. How form and context are combined is a question of considerable theoretical significance.

Two clear alternatives can be distinguished. One is that form and context simply provide separate and independent sources of information. The other is that form and context interact, such that context influences the extraction of form information.

Tulving, Mandler, and Baumal (1964) apparently settled the question in favor of interaction. They pointed out that if one knew the probability (f) of recognizing a word on the basis of form alone, and the probability (c) of recognizing a word given only context, then if form and context make independent contributions to word recognition, the probability (p) of recognizing a word given both form and context should be:

$$p = f + c - fc.$$

Combining eight levels of form information (exposure duration) with four levels of context (number of preceeding words), Tulving et al. found in every instance that performance given both cues exceeded that predicted by the independent sources of information, but that instead, context facilitates the processing of form.

The validity of this argument depends on the validity of the estimates of the probabilities *f* and *c*. If the effect of either form or context in isolation is underestimated, then performance when they are combined will be underestimated, and not because they interact. It occurrred to us that Tulving et al. (1963) may have done just this, for they permitted subjects only one response in each condition. A tachistoscopic presentation may suggest more than one word, and a subject must then arbitrailiy choose a single response from a set of words determined by the form of the stimulus.

In Experiment IV we replicated the experiment of Tulving et al. (1964), save that we permitted our subjects to write down as many words as they liked. We then used as our estimates of *f* the proportion of *subjects* who included the correct word among their responses. With these estimates we found that the combination of form and context yielded exactly the performance predicted by the independence hypothesis. Thus we conclude that, at least in the tachistoscopic situation, context and form provided independent sources of information, and context does not influence the processing of form.

This conclusion contradicts that arrived at by Meyer, Schvaneveldt, and Ruddy (1975) and Becker and Killian (1977). In the lexical decision task, they found that the prior occurrence of a semantically-related word reduces the effect of either degrading or dimming the target word; the effects of form and context on lexical decision latency are evidently not additive and this kind of context appears to interact with form in determining word recognition latency.

We doubt that the use of semantically related isolated words in the lexical decision task adequately represents the influence of sentential context on word recognition. This led us to examine the effect of sentential context on word recognition latency in Experiment V.

We measured the latencies of 16 *subjects* to name 100 words, half in isolation, half preceded by four words of sentence-initial context, at each of two levels of stimulus intensity. We found that both context and intensity had significant effects. In contrast to the results of Meyer et al. (1972) and of Becker and Killian (1977), however, the presence of context did not reduce the effect of dimming the stimulus. Thus our results indicate that sentential context has the same effect on word recognition latency as on accuracy; both results point to the conclusion that context and form are independent, and context does not influence the extraction of information for the visual form.

In summary, our results have contradicted each of the prevailing views of how context influences word recognition. We began by observing that the mechanisms underlying context effects are not well understood; we conclude that the role of context in reading has been seriously misunderstood.

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COLLEGE STUDENTS' WORD IDENTIFICATION STRATEGIES

Introduction

Several theories relating to how students recognize, pronounce, and assign meanings to words have been described in the reading literature. Gibson (1965) described the process of word identification of early readers in four phases. Venezky and Calfee (1970) in their reading competency model discussed word identification as a dual processing activity. Smith (1971) considered word identification as a two stage process: immediate word identification and mediated word identification.

Cunningham (1976) analyzed the preceding models and developed a new synthesized theory of word identification. Her purpose in developing the new synthesized model was to conduct research in which the new model could be subjected to empirical test. Her experiment relied on the teaching of compare-contrast techniques to determine how poor readers mediate the identification of unknown words.

Another study by Samuels, Begy, and Chen (1975) considered the pronunciation strategies of both good and poor readers and the relationship of these strategies to word recognition speed. Perfetti and Hogaboam (1975) conducted a similar study in which they found that when children were presented unknown words tachistoscopically, poor readers took significantly longer to decode them than did good readers.

Rayner (1976), while investigating word processing with a group of adults and children, demonstrated that as readers mature, they increasingly rely on word shape association for unknown word identification. Santa (1976) devised an experiment to determine whether whole words, single letters, or spelling patterns enable a reader to recognize isolated words. She concluded that reading maturity corresponds to flexible word recognition strategies and an increased dependence on larger word segments. Travers (1975) reviewed previous data on word processing and noted that the data added support to the idea that visual features from multiple letter positions within a word are normally encoded in segments rather than in words.

Steele, McMurray, and Laffey (1977) experimented with children's own perceptions of the reading process. The results indicated that for these children in grades two through seven, reading was first a matter of pronunciation which they by and large achieved through phonic analysis. As the children passed through the grades, they went from pronouncing the words in isolated letters and letter sounds to combining the letters into pronounceable words and word segments. Only secondarily did these children consider comprehension, and then their method was contextual analysis.

METHOD

To discover how older students decode and comprehend language, an approach was used which revealed the readers' subjective perceptions of how they identify and understand unfamiliar words. College students were directly asked how they identify words they do not know and how they discover meaning in those words. Then they were observed to see what they actually did. Both good and poor readers were questioned to identify the strategies they used.

An open-ended interviewing technique was used in the study to avoid structuring answers for the students. The interview technique allowed room for all possible responses and also provided a reasonably normal environment.

Subjects

Sixty students were interviewed. These students were selected from classes at James Madison University and Old Dominion University. The interviews were taped and each required from five to twenty minutes.

Of the sixty students interviewed, thirty were identified as good readers and thirty were identified as poor readers. For the purpose of this study, a good reader was defined as being at least two years above grade level in reading vocabulary and comprehension as measured by the Nelson-Denny Reading *Test*. Poor readers were defined as being at least two years below grade level as measured by the *Nelson-Denny Reading Test*.

Procedures

The interview schedule contained the open-ended question: "What do you do when you see a word you don't know as you are reading?" The second part of the interview schedule contained four sentences with stimulus words selected from the Dale-O'Rourke *The Living Word Vocabulary*. The stimulus words were selected because they had low frequency of recognition among college students. Each student was asked to read each sentence aloud. After each sentence was read, the interviewer asked the student doing the reading how he decided to pronounce the underlined word the way he did. For example, the first sentence was "The talk was delivered in a *didactic* manner which was unacceptable to most of the audience." Regardless of how the student pronounced the word, he was asked how he knew how to pronounce it. Next the student was asked what the underlined word in each sentence meant. Then he was asked to explain how he knew the meaning. In interviewing, precautions were taken to see that specific decoding strategies were not mentioned by the interviewer.

Each student's interview was recorded, transcribed, and later analyzed. An individual data sheet of the number of strategies each student used was completed. This data sheet was divided into three sections: (1) What strategies the student said he used, (2) What strategies the student actually used and (3) Which word or words the student was able to accurately pronounce and/or find meaning for.

In order to determine the reliability between interviewers, a sample of students' taped interviews was randomly selected and analyzed independently by the three interviewers. The results of these analyses were tabulated across the categories of word identification strategies included in

88

the interview schedule. Across these categories, there was an interviewer reliability of about ninety percent.

RESULTS

Table 1 depicts the responses of all of the students interviewed as to the strategies they said they used and as to the strategies which they did in fact use. The categories of strategies which appear in the table grew out of the interviews. It is highly significant that fifty-eight out of the sixty students interviewed were concerned only with meaning when they were asked what they did when they saw a word they did not know as they were reading. Only two students said anything about pronunciation when asked this open-ended question.

TABLE 1

Strategies of all College Readers Interviewed

Total N=60

	Said Used		Did Use	
1. Phonic Analysis				
a. Sounding Out	2	(3.2%)	27	(28.2%)
b. Rules	0	(0%)	37	(61.6%)
c. Meaning	0	(0%)	1	(1.6%)
2. Structural Analysis				
a. Syllabication	3	(5%)	41	(68%)
b. Root Words and Segments	15	(25%)	32	(53.2%)
3. Context Analysis	44	(73%)	59	(98%)
4. Etymology	1	(1.6%)	1	(1.6%)
5. Sight Words	2	(3.2%)	15	(25%)
6. Configuration Clues	1	(1.6%)	1	(1.6%)
7. Dictionary Skills				
a. Pronunciation	0	(0%)	0	(0%)
b. Meaning	24	(40%)	0	(0%)
8. Other	6	(10%)	9	(15%)

To find meaning, forty-four of these college students said they would use contextual analysis, and twenty-four said they would consult a dictionary. Three of the sixty said that they would use syllabication for meaning, and fifteen said they would use root words or segments.

When it came to actual practice, however, the responses were more varied. Fifty-nine of the students used contextual analysis to find meaning, considerably more than the forty-four who mentioned it as a strategy in response to the opening theoretical question. They said such things as the following: "*Didactic* means unclear or disturbing because it was unacceptable to most of the audience." "*Pemmican* could be currency because it was equally divided among the travelers." "*Gnosis* is some kind of state of mind because you can get it through prayer." In addition to contextual analysis for meaning, thirty-two of the students used root words or segments. One student, for example, said in the case of *revenant*, "A *revenant* is someone who is revered — like *rev*. Lots of times people are uncomfortable when there is a preacher around."

The pronunciation responses were more varied than those given for meaning. Although only two students said anything about pronunciation in answer to the open-ended beginning question about what to do when an unknown word is met, twenty-seven of the sixty actually sounded out the underlined words. Thirty-seven of the sixty mentioned rules when they were asked why they pronounced the underlined words the way they did as in when the *g* and *n* come together in a word, the *g* is silent. Forty-one of the students syllabicated in order to pronounce the words and thirty-two used root words and word segments as an aid. The most important development in this area was that word association to find pronunciation for unknown words was used seventy-two times by the students. One student said, for example, "*Revenant* is pronounced *revenant* because it is like *reverance*." Another reader said that he knew how to pronounce *gnosis* because it was like *hypnosis*. Still another student said, "*Pemmican* looks like *pelican* so it has to be pronounced that way."

A comparison of good and poor readers revealed some interesting information as Table II shows.

TABLE II

Strategies of Good and Poor College Readers

	Said Used		Did Use	
	Good N = 30	Poor N = 30	Good N = 30	Poor N = 30
1. Phonic Analysis				
a. Sounding Out	1 (3%)	1 (3%)	14 (47%)	13 (42%)
b. Rules	0 (0%)	0 (0%)	20 (67%)	17 (56%)
c. Meaning	0 (0%)	0 (0%)	0 (0%)	1 (3%)
2. Structural Analysis				
a. Syllabication	1 (3%)	2 (6%)	23 (76%)	18 (59%)
b. Root Words	4 (12%)	11 (36%)	16 (53%)	16 (53%)
3. Context Analysis	22 (72%)	22 (72%)	30 (100%)	29 (97%)
4. Etymology	0 (0%)	1 (3%)	0 (0%)	1 (3%)
5. Sight Words	2 (6%)	0 (0%)	11 (36%)	4 (12%)
6. Configuration	0 (0%)	1 (3%)	0 (0%)	1 (3%)
7. Dictionary Skills				
a. Pronunciation	1 (3%)	1 (3%)	0 (0%)	0 (0%)
b. Meaning	10 (33%)	14 (47%)	0 (0%)	0 (0%)
8. Other	1 (3%)	5 (15%)	6 (18%)	3 (9%)

In terms of the items included in Table II, both good and poor readers used essentially the same strategies in analyzing unknown words.

Where the strategy variance was really noticed was in the word association responses. For example, in response to the stimulus word *revenant*, the students associated the following words: *reverent, reverence, reverend, revered, remnant, revenue, relevant,* and *venerable*. For the stimulus word *didactic*, they associated these four words: *dictator, dictate, tactic,* and *attic*. For the stimulus word *gnosis*, the students associated *osmosis, hypnosis, gnostic, gnat, pneumonia,* and *science*. Interestingly, the stimulus word *pemmican* only produced two associations: *American* and *pelican*. Although both good and poor readers made these associations, good readers used this strategy fifty-one times whereas the poor readers used it only twenty-one times. The fascinating aspect of the above result is that the more associations the students made, regardless of apparent relevancy, the more successful they were in pronouncing the words.

FINDINGS AND CONCLUSIONS

In this study which depended upon their subjective perceptions of how they identify and understand unfamiliar words, college students were primarily interested in word comprehension rather than in accuracy of pronunciation. In fact, fifty-eight of the sixty college students participating in the study did not consider pronunciation until they were asked to read aloud. Then they used the traditional decoding strategies of phonic and structural analysis. For finding word meaning, all but one of these college readers used contextual analysis as their chief strategy. Interestingly enough, both good and poor readers used these skills.

The largest difference between the strategies of the good and poor college readers was in the use of word and word segment association for pronunciation. By a margin of better than two to one, good readers in this study used this technique.

The findings of this study provide empirical evidence in support of the Gibson, Venezky and Calfee, and Smith models which say that word processing skills develop in stages with the word association technique being the most highly developed.

The findings of this study concur with the findings of the earlier cited Cunningham study in which Cunningham tested her model, based upon the Gibson, Venezky and Calfee, and Smith models, and demonstrated that students can be successfully taught to mediate the identification of unknown words by comparing them to known words and word segments which are somehow stored in their memories. The findings of this study also demonstrate the developmental nature of word processing as did the research of Santa and Rayner.

Finally, the findings of this study support the findings of the earlier mentioned Steele, McMurray, and Laffey research on children, grades two to seven, in which the children were asked to report their own perceptions of how they process words and were then observed to see what they actually did. It is in fact really a continuation of the earlier study which demonstrated that word processing is developmental in nature and that as children pass through the early school grades and become more mature in their word processing skills, they tend to rely more and more on word segment and whole word association to identify unknown words. By college age, as this study demonstrates, it is the use of this word association strategy that distinguishes the good reader from the poor.

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TEXT TYPE AND CHILDREN'S RECALL

The struggle to understand the process of reading comprehension has grown in intensity during the past decade, as researchers such as Kintsch (1972) and Bransford and Johnson (1972) have taken new approaches to the investigation. Propositional analysis has provided a method of analyzing reader recall that frees research from measuring comprehension only in terms of the questions the researcher can think to ask. As a result, a great deal of research has recently been conducted in an attempt to understand and model the process of reading comprehension for the fluent reader, and for the developing reader. Both lines of inquiry have important theoretical and instructional implications.

At least as important is the necessity to understand the process of reading comprehension in the beginning reader. Unfortunately, that presents some unique problems simply because the subject is a "beginning reader" with limited word recognition abilities. However Kintsch and Kozminsky (1977) have reported no significant differences for fluent readers between reading and listening tasks. Additionally, Kintsch (1977) has asserted that "performance on comprehension tasks after listening to a text provides a pure reflection of the comprehension processes themselves." (p. 491). Therefore the listening-recall task seems to be a possible vehicle for further exploring the comprehension process of the beginning reader.

EXPERIMENTAL DESIGN

In this study, eight first graders and eight second graders were asked to listen to two "stories" and then to retell the stories orally. Subjects were selected on the basis of test scores and teacher judgment to represent the range of readiness or reading achievement skills typical of beginning first or second graders. The texts consisted of one narrative account called *Taffy* (adapted from *Reader's Digest Reading Skill Builder,* Level 2, Part 2, p. 10-13) and one expository account called *Crickets* (excerpted from *Reader's Digest Skill Builder,* Level 3, Part 3, p. 67-70). The accounts were slightly over 200 words long and had approximately equal sentence length and vocabulary load as measured by the Fry Readability Scale. Both accounts dealt with topics somewhat familiar to the children. All listening and retelling tasks were conducted individually. To avoid biasing the results by a practice effect in the listening-retelling task, half of the children heard *Crickets* the first day, while the others heard *Taffy*. After twenty-four hours, the children were again asked to retell the story heard the day before. They then listened to and retold the second story.

The sixteen protocols resulting from the immediate retelling of each story and the eight, twenty-four hour delayed recall protocols for each account were compared to the original text by means of the Drum and Lantaff (1977) method of propositional analysis. Propositional analysis of the original text accounts was done as a simple two-class superordinate/subordinate framework. A binary split was also carried out on the children's protocols. Propositions from the children's protocols which would be classified by Kintsch and van Dijk (1978) as reproductive or reconstructions were treated as text-related. All other prepositions, those labeled text-evoked or text-external by Drum (1977) or metastatements by Kintsch and van Dijk (1978) were treated as text-unrelated. Text-related propositions were matched against the superordinate/subordinate split of the original text.

RESULTS

First graders immediate recall of narrative text (total text related propositions $M = 8$, $SD = 3.8$) seems slightly superior to their recall of expository text ($M = 6.4$, $SD = 3.9$). Twenty-four hour recall by first graders showed relatively slight and roughly equivalent drops in text-related propositions across both text types (narrative total $M = 5.7$, $SC = 4.5$; expository total $M = 5.3$, $SD = 2.6$).

Second graders' immediate recall of narrative text (T T-R P $M = 16.9$, $SD = 7.5$) appears superior to their recall of the expository passage (T T-R P $M = 13.8$, $SD = 10.4$). However, twenty-four hour recall of the narrative passage (T T-R P $M = 11.8$, $SD = 5.6$) showed a considerable decline, while delayed recall of the expository text (T T-R P $M = 18.5$, $SD = 5.0$) showed an increase of both superordinate and subordinate propositions, to a level of recall greater than original recall for the narrative passage.

Second graders were generally superior to first graders in their recall of both narrative and expository text under both immediate and delayed retelling conditions. Collapsed across grade levels, first and second graders were more likely to recall superordinate (30% of possible) as subordinate propositions (20% of possible) under both text types and both retelling conditions. In addition, both first and second graders used more text-unrelated propositions in their immediate retelling of the expository passage ($M = 7$, $SD = 11.7$), than they did for the narrative passage ($M = 3.9$, $SD = 4.6$). Conversely, on the delayed retelling, they used fewer text-unrelated propositions for the expository passage ($M = 3.4$, $SD = 4.5$) than for the narrative passage ($M = 6.4$, $SD = 5.2$).

In a further attempt to analyze the comparative effect of text type on the recall of first and second graders, the children's text-related propositions from immediate recall were mapped against the framework provided by the propositional analysis of the original text. For both first and second graders, the propositional map of the narrative passage shows a rough adherence to the major events within the story, even where those events are not represented in the analysis by a superordinate proposition. These major events are represented in the recall protocols with roughly the same level of frequency regardless of their position within the chronology of the story. However, second graders were able to provide more of the enriching details surrounding these major events than were the first graders.

Mapping of recall for the expository text showed a very different pattern. First graders' recall clustered around two statements occurring approximately in the middle of the passage. Second graders' recall clustering around the same two statements, but from the introduction of the first of those statements until the end of the passage almost all propositions were reflected, including a major clustering around the final superordinate proposition which had gone virtually ignored by the first graders.

DISCUSSION

If the superordinate proposition is regarded as roughly equivalent to Kintsch's macroproposition, beginning readers show the same tendency as fluent readers to retain macropropositions over micropropositions. This relative superiority of retention of macropropositions was not affected by text type.

Quantitative comparisons of immediate recall by beginning readers show the same pattern of superiority for recall of narrative text as reported by Lantaff (1978) in a study of developing and fluent readers; and seems to further confirm the value of temporal and causal relationships within text as facilitators of the comprehension process. The greater recall shown by second graders over first graders would seem to reflect their greater maturity, possibly longer attention spans, and perhaps more practice with listening - retelling or remembering tasks in their school experience.

Text type does appear to affect differentially the delayed recall of first and second graders. Several explanations are possible. One hypothesis suggests that this difference is related to previous instructional experience. First graders may regard the story line of the narrative account as equal in value to the facts presented by the expository passage, and thus make equal effort to hold both in long term memory. Second graders, on the other hand, may have learned through their school experience that "stories" need not be retained for further tests. Although their original comprehension of the narrative passage was greater, the information received from it apparently was not as likely to be stored for long term retrieval.

From an educational perspective, it is also instructive to note how little was actually stored accurately from either text-type (*M* = 25% of possible propositions). A few examples of the children's erroneous recall produced cricket beavers, frog crickets and grashopper crickets, crickets colored red, white, green, striped and spotted as well as black, and finally crickets that "lived happily ever after." These errors may reflect an attempt by the children to fill in information from their experience background as the task got tougher (e.g. immediate recall of the expository passage and delayed recall of the narrative passage) as long as they felt some possibility of succeeding. Since immediate recall of the expository passage had shown it to be a difficult task, the drop in text-unrelated propositions on delayed recall may reflect lowered expectations for success and thus fewer attempts to fill in poorly understood areas of the text.

Mapping of the immediate recall propositions from both text-types further illuminates the role of experience background and expectation in the comprehension process of beginning readers. Recall of the narrative passage provided both first and second graders with a realtively accurate although simplistic summary of the important points in the story. The first graders' recall map of propositions from the expository passage seems to reflect neither the "leading edge" or recency models of the comprehension process. Instead, recall clusters appear around the appearance in the text of the words: "mother," "babies," and "father," words that are likely to carry a high value load in the experience background of the children. Recall by the second graders shows clustering around the appearance of these same terms coupled with a strong recency effect. Second graders recalled as many propositions from the final 20 propositions in the original text as from the preceding 60 propositions. These results suggest that there may be developmental differences in the comprehension process that at least in part interact with text-types.

CONCLUSIONS

Results based on a sample size this small must be viewed very cautiously and require validation by further studies. However some tentative implications for instruction can be suggested, based on these results.

Recall of the narrative passage seems to support again the contention that a strong story line is essential in text for young children. Propositional analysis of the narrative recall of both first and second graders showed clustering around the major story events, producing an accurate although simplistic story summary. Expository passage recall showed clustering around propositions which the children could relate directly to key persons typically found in their own experience backgrounds. These recall propositional analysis results strengthen the position that instruction from expository text will be most successful when a deliberate attempt is made to relate it to concrete experiences.

In addition, the low level of actual recall (approximately 25% of possible propositions) re-emphasizes the need for repetition in the presentation of new instructional material. The number of unrelated propositions present in the recall protocols indicate that where sufficient repetition is not available, children will attempt to "fill-in" material from their own experience backgrounds. This will frequently result in confusion since the experiences may not be directly appropriate to the task at hand.

Finally, recall clustering for the expository text showed a different pattern for first than for second graders. First graders seemed to rely solely on a match of propositions to words of high value in their experience backgrounds. While second graders also showed clustering around these "significant experience" terms, they also showed a strong recency effect in their recall. If future research validates these findings, it would seem that we must look at the comprehension process as subject to developmental change. A model based on the performance of fluent readers may not provide an adequate theoretical base for instruction of beginning readers.

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VERBALIZATION OF SCHEMATA OVER TIME: INVESTIGATION OF CHANGES FOR FIFTH GRADERS AND ADULTS

The evidence of the power of schemata in language comprehension processes is persuasive. We know for instance, that schemata of language users are probably a principal determiner of what a reader can learn from text (Anderson, Spiro, & Anderson, 1978). We know, furthermore, that text information that does not appear to fit into slots of relevant schemata may be perceived by a language user as insignificant (Anderson, 1977a; Anderson & Pichert, 1978; Pichert & Anderson, 1977). Finally, we have evidence that schemata are often imposed on text, even when it can be demonstrated that some violence is done to the text information (Anderson, Reynolds, Schallert, & Goetz, 1977). Given demonstrations of the powerful effect of schemata on language comprehension processes, generating theoretically acceptable and empirically manageable characterizations of these abstract knowledge structures seems an important enterprise for reading researchers.

Part of that enterprise is the study of schemata change. Two rather different sorts of change were investigated in these two studies with fifth graders and adults. One sort is discussed by Chafe (1977). He is interested in what he labels "verbalization" — "all those processes by which nonverbal knowledge is turned into language" (p. 41). He suggests that these verbalizations are "creative," that speakers structure elements of events they describe quite differently across time.

A different sort of schemata change is discussed by Anderson (1977b). He states that, given schema-text informational inconsistency, language users are likely to resort to counterargument within a current framework, to treatment of anomalies as exceptions, or to separation of incompatible information. He points out that the last thing a person does is make a fundamental change in schemata.

Do verbalizations of schemata change dramatically over time? Do language users respond to informational jolts and alter verbalized schemata? Those research questions prompted two studies — the first with fifth graders and the second with college undergraduates.

METHOD

Subjects

Forty-two fifth graders from a Cheverly, Maryland K-8 school participated in the first study. Cheverly is a middle class suburb of Washington, D.C. Thirty-six college students from an undergraduate reading methods course at the University of Maryland participated in the second study as partial fulfillment of a course requirement.

Materials

Chafe's work with verbalized knowledge had focused on events; the decision was made to look in these studies at object schemata. For two reasons, the topic of "dinosaurs" was selected. One reason was the fact that subject experience with dinosaurs — in the flesh or in print — over the period of the studies was highly unlikely. Had a topic such as "basketball" or "guinea pigs" or "spaghetti" been used, differential experience during the experiments would have been a distinct possibility. Research questions of interest were time-related verbalization changes and informational jolt-related verbalization changes; new experiences (and potentially new knowledge) would confound results.

A second reason for selecting the "dinosaurs" topic was the appearance of a *Scientific American* article (Bakker, 1975) on dinosaur evolution. The major thesis of the piece was that dinosaurs were not in fact reptiles, but were warm-blooded ancestors of today's birds. This notion is inconsistent with the much-taught view (stated explicitly in 10 of 10 elementary science texts surveyed by the investigator) that dinosaurs were cold-blooded ancestors of today's reptiles. It seemed that the Bakker view might serve as an informational jolt for the studies.

Procedure

In both studies, subjects were seen in two sittings. In both sittings they responded to written material packets, working in large-group situations. They were not permitted to discuss the tasks with fellow students or with the investigator.

Sitting one. Though fifth graders in the first study and undergraduates in the second study were randomly assigned to treatment groups for investigation of differential informational jolt effects, the task in sitting one was uniform for all treatment groups. Subjects first received a sheet of paper with 15 lines and with the following directive at the top:

> Think about dinosaurs. Provide as much information as you can about dinosaurs.

When subjects indicated that they were finished with this step, they were given index card packets and a second sheet of paper with the following directives:

> Now you are going to work with index cards. The piece you have just written about dinosaurs will guide your work on this part of the task.
>
> On the one *yellow* card write the most important idea about dinosaurs. On the two *blue* cards write the next most important ideas. On the three *white* cards write the less important ideas about dinosaurs. Though the piece you have written will guide you, you may add or delete bits of information.
>
> You may request as many white cards as you wish. On any unused cards, write "No Response."

Sitting two. Two weeks later in each study, subjects were given a sheet of paper with directives varying according to treatment. One-third of the fifth-grade group and one-third of the undergraduate group were directed as follows:

> Think about dinosaurs. Provide as much information as you can about dinosaurs.

A second third of each group received the following directive:

> Think about dinosaurs. Provide as much information as you can in response to the following statement: *Dinosaurs are cold-blooded ancestors of today's reptiles.*

A final third of each group received this guidance:

> Think about dinosaurs. Provide as much information as you can in response to the following statement: *Dinosaurs are warm-blooded ancestors of today's birds.*

When subjects indicated that they were finished with this step, they were given index card packets and a second sheet of paper with exactly the same directions they had been given in sitting one.

A final task was presented to all subjects in sitting two. This task was included to assess the "jolt value" of the "warm-blooded" statement. The survey of elementary science texts had provided preliminary confirmation that this was indeed new information. It was possible, however, that fifth graders or undergraduates already accepted the Bakker view on the "warm-blooded"-"cold-blooded" issue. If this were the case, the "jolt value" of the "warm-blooded" information would be minimal. Therefore, on a third sheet, all subjects were directed in the following manner:

> Think one last time about dinosaurs. In terms of all the information you have about dinosaurs, X the statement with which you are more comfortable. You may X both.
>
> ____*Dinosaurs are cold-blooded ancestors of today's reptiles.*
>
> ____*Dinosaurs are warm-blooded ancestors of today's birds.*

In terms of this "comfortableness" measure, among the 42 fifth-graders, 38 subjects Xed the "cold-blooded" statement, and four Xed the alternative. In similar fashion, among the 36 undergraduates, 35 subjects Xed the "cold-blooded" statement, and one Xed the alternative. In both studies, it seemed justifiable to presume that the "warm-blooded" information had in fact provided "jolt value" for the purpose of the study.

RESULTS

To analyze changes in verbalized schemata, the investigator and a research assistant studied the two index card packets provided by fifth graders and undergraduates in the two sittings. Working independently, they scored each instance of information comparable in gist and on the same color card as a "one." Clearly, if substantial changes in verbalized schemata were the pattern in the studies, scores would be low, close to zero. On the other hand, if great stability in verbalizations were the pattern, scores would approximate six, the total number of cards used by subjects. Agreement on scoring between judges was .94 for fifth-grade information, .92 for undergraduate information.

The mean scores of matched bits of information across all treatment groups were calculated to answer the schemata change-across-time question. The mean scores (1.142 for fifth-grade subjects, 1.278 for undergraduate subjects) were quite low. The low scores suggest that structured verbalizations of schemata do change over time.

Next, an analysis of variance among scores for the three (neutral, "cold-blooded," or "warm-blooded" directive) treatment groups in the studies was performed to answer the informational jolt response questions. If the "warm-blooded" statement presumed to have "jolt value" in fact affected verbalized schemata very little, one would anticipate that all three groups in both studies would reflect schemata change over time about equally, with no clear differences arising from treatment. Within both experiments, that was not the case. The differences among mean scores for neutral-directive fifth graders (2.143), for "cold-blooded"-directive fifth graders (.786), and for "warm-blooded"-directive fifth graders (.500) were analyzed by a one-way analysis of variance. There were significant differences among treatment groups, F (2, 39) = 21.486, $p < .001$. Similarly, the differences among mean scores for neutral-directive undergraduates (2.75), for "cold-blooded"-directive undergraduates (.917), and for "warm-blooded"-directive undergraduates (.167) were analyzed, and there were again significant differences among treatment groups, F (2, 33) = 15.595, $p < .001$. The significant differences suggest that language users do respond to informational jolts and alter verbalized schemata.

DISCUSSION

Within the two studies, there was evidence of two sorts of verbalized schemata changes. Structured verbalizations changed over time, and verbalizations changed differentially according to the presence or absence of an informational jolt.

The change-across-time finding supports the Chafe (1977) position. Subjects' providing and structuring different bits of information about dinosaurs in the two sittings lend support to the notion of "creative" verbalization. Chafe had discussed the phenomenon for event schemata; these studies provide some evidence that the phenomenon holds for at least one object schema (dinosaurs) as well.

The informational jolt response finding might be a source of optimism to schema theorists who have shared evidence of imposed intact schemata, unaffected by incoming jarring information from external sources (e.g., from text). However, to say major perspective shifts have occurred within this study would be to say too much. In studying mean scores, we *can* say that neutral-directive subjects — given exactly the same directive across two sittings — maintained some elements of their dinosaur schemata, and that other subjects — given a statement to which they had to respond to the second sitting — maintained very few elements in the verbalized schemata. It would seem that needing to deal with information provided externally does in fact prompt change in verbalization of the internal knowledge structure. We then have demonstration of at least two sources of creativity in verbalization of schemata: time and external information (not necessarily new information).

The point of old-new, comfortable-uncomfortable information comes in looking at differences between the "cold-blooded" and "warm-blooded" treatment group means. Both groups were seen across the same time span, and both groups were given external information to which they needed to respond. The only difference in treatment between *these* groups that might in turn account for the greater changes in verbalizations for the "warm-blooded" contingent is the greater "jolt value" of the "warm-blooded" statement (as verified by the "comfortableness" measure). Jolting, jarring information might then be added to the list of potential sources of creativity in verbalized schemata.

To point out apparent impact of time, of external information, of "jolt value" information on verbalized schemata is not, however, to argue that subjects have changed minds or perspectives; they simply have changed verbalizations from sitting to sitting, perhaps at least partially in response to the three intervening factors. It seems that a next research tactic might well be qualitative analysis of these verbalization changes. The first-step quantitative analysis gives us no leads about the nature or extent of such changes.

Another important step in a schemata change research program is investigation of responses by readers to chunks of text that require response and accommodation. One key variable for investigation might be degree of emotional investment. It might well be that resistance to change is the norm for emotional investment schemata (e.g., matters related to politics, ethics, much-rehearsed routines), whereas some capacity to change is the pattern for more impersonal schemata (e.g., dinosaur evolution).

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CRITICAL PICTURE COMPREHENSION SKILLS AND THE CHILD'S SENSE OF STORY

Teachers have made extensive use of pictures in their reading instruction for enhancing experiential background, for stimulating children's thinking, and for stimulating language. The kinds of tasks beginning readers are typically asked to do regarding pictures include, for example, noting details, identifying characters in the picture, describing action, speculating what might have happened before and after the pictured event, identifying a setting, distinguishing fantasy and reality, supplying conversation for the characters, and placing a group of pictures in sequence. Examination of this list of picture-related activities indicates that these are among the basic comprehension skills dealt with in reading instruction throughout the grades. A number of the skills mentioned are at the critical level. It seems that the use of pictures can provide teachers with a foundation for the teaching of subsequent comprehension skills.

Pictures may also serve as a source for developing oral language skills. Monroe's (1951) scale for the informal assessment of language analyzes children's responses upon viewing a picture. Five areas of language ability are considered on the Monroe scale: general expressiveness, word meaning, sentence structure, general interpretation, and qualities of speech. Areas of strength and weakness in language are noted, and a subsequent program to enhance language skills can be developed.

Critical picture comprehension skills, in terms of a child's ability to tell a story, were investigated in the research described in this paper. The wordless book *Bubble Bubble* (Mayer, 1973) served as the stimulus for the oral story. Wordless books, which make use of a sequence of related pictures, are a relatively recent innovation in the field of children's literature. There is little information concerning wordless books in the professional literature. They are discussed primarily in terms of their possible uses. For example, it is suggested that wordless books be used in the development of oral language skills, as a stimulus in the language experience approach, as an aid in developing book handling skills and front-to-back and left-to-right progression, and in the development of the concept of sequencing (Larrick, 1976; Strickland, 1977). There are few references to using wordless books for their storytelling value or for the development of the child's concept of "what is a 'story'?"

A review of the literature elicited only two research studies involving the use of wordless books. Jett-Simpson (1976) investigated the inferential comprehension of kindergarten, second, and fourth grade children based on their ability to tell a story from a wordless book. The author's purpose was to develop a classification system of verbal inferences. One conclusion of Jett-Simpson's pertinent to the present study was that it appeared that the subjects' inferential comprehension of the elements of plot, character, and setting was of a holistic rather than hierarchical nature. Omotoso and Lamme (1979) used wordless books to explore differences in visual literacy and syntactic maturity in groups of seven year olds from different cultural backgrounds. The authors concluded that wordless books have value in oral language development, in reading readiness activities, and in instruction of children with non-English language backgrounds.

METHOD

The subjects who participated in this study were 167 children enrolled in 12 public school kindergarten classes in a midwestern plains city. The subjects were presented with *Bubble Bubble* and allowed to look through the entire book. After the initial viewing, they were requested to "tell a story" as they looked through the book a second time. Their responses were tape recorded and later transcribed. The instrument shown in Table 1 was developed to assess the story content of the subjects' responses and was applied to each of the transcriptions.

TABLE 1
Story Content Scale for Evaluating Language Samples

Criteria	Yes	No
1. Offered a story beginning (eg. once upon a time . . ., once a boy . . .)		
2. Developed sequence of events to form a logical story plot throughout		
3. Supplied supporting details		
4. Identified story characters		
a). Indicated interaction among characters		
b). Maintained same characters throughout		
c). Gave names to characters		
5. Maintained consistent point of view		
6. Used dialogue from characters		
7. Brought story to logical conclusion		

To establish the reliability of the instrument, 20 transcripts were randomly selected for review and were evaluated by a group of four readers. Ebel's model of determining the reliability among raters was applied to the data. A high degree of reliability among readers (r = .96) was obtained to support the use of the instrument to evaluate the story content of the oral language samples.

RESULTS

There was a total possible score of 10 if the subjects' responses met the story content criteria indicated on the instrument. The overall mean of the sample on literary content was 4.37.

Analysis of the language samples also revealed that three different styles of telling the stories were being used by the subjects. The lowest level style of story-telling was "labeling." These stories were characterized by one-word labels of objects in the pictures or by phrase labels, as shown in the following:

> "Boy. Bubbles. Man. Boy. Kangaroo. Snake. Cat. . . . Elephant. . . . Mouse. . . ."
>
> "Blowing bubbles. Lotsa bubbles. . . . Playing with them. Make a snake. . . ."

The most frequent style used by the children was "conversational." Language samples which featured the children's stringing together of ideas with repeated connectives such as "and" and "and then" fell into this group. For example,

> ". . . He blew a kangaroo . . . And then he blew a snake and a shoe. And the snake scared him away. Then he blew a cat and the cat scared him. And the cat and the snake. And then the cat got all wrapped up and he wanted to see him again. And then he blew a elephant. . ."

The third classification, "book language," was the most sophisticated style of the three. "Book language" was considered to be a more formalized language structure, as shown in the following:

> "Once upon a time there was this little boy that liked to blow bubbles. So he asked his mother if he can have some money to go to the store to buy some. First, he looked over the fence and then he saw bubbles floating all around from the bubble man. Then he came over and said, 'Can I have some bubbles. . .'"

Of the total number of language samples, 15.6% were classified as "labeling" (*M* = 1.81 on story content). Approximately 64.1% of the subjects' stories were considered to be "conversational" (*M* = 4.44 on story content). The "book language" group amounted to 20.3% of the children's responses (*M* = 6.09 on literary content).

In order to determine if the style of telling the story affected the literary content score, a one way analysis of variance was performed. The results of the analysis of variance indicated that there was a significant difference in the score on literary content as a result of the language style used in telling the story, $F\ (2,\ 164) = 38.86$, $p < .001$. An Eta coefficient was computed to determine the magnitude of the effect. The resulting coefficient of .57 indicated a moderate association between language style and story content. Approximately 32% of the variation in story content can be explained by knowing the style of language the children used in the oral language task. A Duncan's Multiple Range After-Test was used to determine significant differences between means. The results of the after-test indicated that the group whose oral language reflected the style classified as "book language" had significantly higher ($p < .01$) mean scores in literary content than those classified as "conversational" or "labeling." The group whose oral language style was classified as "conversational" had significantly higher ($p < .01$) mean scores on literary content than those classified as "labeling."

DISCUSSION

The literary content scores (*M* = 4.37) suggest a need to develop the critical picture comprehension skills assessed on the instrument. Based on the evaluation of students' oral language using an instrument such as the one described here, teachers might develop a series of questions and activities to improve areas of critical picture comprehension in which students appeared weak. Wordless books are available in a wide range of difficulty levels with regard to amount of detail depicted and plot complexity.

It should be noted that an underlying factor which may have influenced the resulting production was the nature of the task. The children were asked to tell a "story" about the wordless book after looking at it. It is possible that "story" is one of those concepts one expects a child to possess. Researchers (Downing & Oliver, 1974; Fox, 1976) have reported that children experience confusion about such linguistic concepts as "word," "letter," and "sound," and suggest instruction to develop these concepts. It may be beneficial to work with the concept of "story" as well.

The results of the one way analysis of variance indicate that the language style of a child does affect the content of the story he or she tells. Apparently, those children who utilized a more formal, book-like language tend to have a better concept of a "story." In pointing out that book language and oral language differ in structure, Smith (1978) recommended transferring knowledge of the conventions of oral language to the more formalized style of written language. By assessing the styles of language children use in telling a story, as well as the content, teachers might develop a language program which builds toward a more book-like style that might better prepare children for their experiences with written language.

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THE EFFECTS OF SENTENCE EXPANSION PRACTICE ON THE READING COMPREHENSION AND WRITING ABILITY OF THIRD-GRADERS

The primary purpose of this study was to assess the effects of sentence expansion practice on third grade students' comprehension of passages written at varying levels of syntactic complexity. A secondary purpose was to explore specific rhetorical and arhetorical aspects of the experimental group's compositions.

Sentence expansion practice typically aims at assisting students to combine two or more kernel sentences to produce a more complex sentence indicative of more mature writing. An increase in complexity may be accomplished through transformations such as co-ordinating subjects or predicates, modifiers, phrases, or clauses. Such techniques have been proven effective. From a more theoretical perspective Fodor's (1975) "analysis by analysis" model suggests that a language receiver reverses the transformations of the incoming sentence to uncover the deep structure, a process which indicates a possible relationship between sentence expansion ability and comprehension ability. This study was intended to shed some light on both the pragmatic and theoretical aspects of sentence expansion and comprehension.

RELATED RESEARCH

Previous research has shown that sentence expansion practice appears to lead to an increase in the structural complexity of the writing of seventh graders (Mellon, 1969; O'Hare, 1973; Combs, 1976), of fourth graders (Miller and Ney, 1968), and even for second graders (Hilfman, 1970; Young, 1970).

There is also some evidence that suggests that reading comprehension is facilitated when reading materials are patterned after the students' productive language in terms of syntactic complexity and types of structures used (Smith, 1970; Tatham, 1970; Peltz, 1974). In addition, some studies suggest that a student's reading comprehension is related to his oral use of syntactically complex structures (Bougere, 1969; Harris, 1975). There is little agreement, however, as to whether increasing students' use of complex structures through sentence expansion instruction will result in improved reading comprehension (Hilfman, 1970; Hughes, 1975; Fisher, 1976; Klassen, 1976).

The relationship between quantitative and qualitative aspects of composition is an important one (Lundsteen, 1976; Combs, 1976; Cooper, 1977). Since the *Evaluation Guide for Children's Composition* (Sundbye, 1973) had proven valuable in working with teachers (Froese, 1977) it was selected as a method of rating rhetorical quality.

106

METHOD

In this study the experimental sentence expansion treatment and three comparison treatments were administered to groups of third grade students for a period of four weeks. All students wrote a narrative composition and completed a cloze test before the treatments began. Both after the treatment period and again after a three week delay all students wrote narrative compositions and completed three cloze tests written at increasing levels of syntactic complexity.

The measure of syntactic complexity used to assess the cloze passages and the students' compositions was the mean T-unit length. This measure was defined by Hunt (1965) as one main clause plus any clauses or non-clausal structures attached to it or embedded in it. One cloze test was written to correspond to the students' approximate productive level (PL) determined by a pilot study to be approximately 9.03 words per T-unit, whereas the other tests were written to have successively longer T-units; passage two (PL + 4) had 13.0 words per T-unit and passage three (PL + 8) had 17.46 words per T-unit.

All compositions were analyzed for T-unit length. In addition, experimental group compositions were rated by teachers according to thirteen factors on the *Evaluation Guide for Children's Compositions* (Sundbye, 1973).

The experimental treatment consisted of eight half hour lessons in sentence expansion techniques designed to elicit the following structures: adjective words and phrases, adverbial clauses beginning with "when"; adjective clauses beginning with "who", "which", "that", and "where"; and co-ordinated predicates. The class was divided into two groups which were taught separately in order to promote interaction and participation in discussions. Alternative solutions to sentence expansion problems were compared and evaluated by students. Attention was focussed on the way the deep structure might be represented in a variety of surface structures.

The three comparison treatments consisted of:

a) eight half hour lessons based on the Directed Reading Thinking Activity or DRTA as outlined by Stauffer (1975),

b) eight half hour periods of free time to choose from a variety of activities, and

c) no depature from the regular timetable and course work.

The DRTA treatment was intended to control for any possible effects due to participation and interaction in small group discussions. As in the experimental treatment, the class was divided into two groups which were taught separately.

Sample

A total of ninety-five third grade students from two schools in the same Winnipeg suburban school division participated in the study. The sentence expansion and the DRTA treatments were administered to two classes in one school, while the two classes in the other school received the other treatments. All classes were receiving reading instruction from the Collier Macmillan basal reading series. The mean number of correct responses on the cloze pretest were respectively: experimental group, 31.08; DRTA group, 29.65; free time group, 35.08; control group, 30.54. Mean T-unit length at pretest time were 8.75, 8.18, 8.91 and 7.84, respectively. For all groups combined the mean T-unit length was 8.45 as compared to Hunt's (1965) 7.67 and Loban's (1976) 7.6 for the same grade level.

RESULTS

In the analysis of cloze comprehension scores, the pretest cloze scores were used as covariates to control partially for initial differences in cloze comprehension ability. A factorial analysis of covariance for the posttest scores revealed significant differences among the four groups ($F(3,88) = 10.38, p < .001$), and across the three levels of syntactic complexity ($F(2,178) = 120.79, p < .001$), as well as a significant interaction between treatment group and complexity of cloze test ($F(6,178) = 4.00, p = < .001$). The significant interaction was further probed by a trend analysis of simple main effects. The purpose of this analysis was to determine whether the four treatment groups exhibited similar trends of performance across the three levels of syntactic complexity of cloze tests. A significant linar component was found for the trend of each of the four groups ($p < .01$). The quadratic component of the trend was significant for the experimental group ($F(1,89) = 20.88, p < .01$) but not for any of the other groups. These results show that, although for all groups the cloze scores decreased from PL to PL + *8, the experimental group had a significantly different trend of scores across the three levels of complexity. Their performance was constant from PL to PL + 4, and then decreased to PL + 8. All other groups decreased systematically from PL to PL + 4 to PL +* 8. This trend in the experimental group's performance, however, was not maintained on the delayed posttest since there was no significant interaction.

Arhetorical aspects of students' writing were reflected by mean T-unit length. A factorial analysis of variance indicated that the sentence expansion treatment had no significant effect on mean T-unit length ($F(3,81) = 2.45, p > .05$) measure.

Only the experimental group compositions were probed for rhetorical quality. Neither the total Sundbye rating nor any of the thirteen Sundbye subscores were found to be significantly correlated with mean T-unit length or cloze comprehension. A correlation matrix indicated that some of the Sundbye subscores were better predictors of total Sundbye rating than others. The significant subscores are presented in order of their predictive value:

#5 ($r(16) = .77, p < .01$) The child maintains a simple time sequence in his story.

#9 ($r(16) = .72, p < .01$) The child uses co-ordinators to combine some sentence elements.

#11 ($r(16) = .68, p < .01$) The child uses a third person rather than an egocentric point of view.

#6 ($r(16) = .56, p < .05$) The child uses modifiers for nouns and verbs.

#7 ($r(16) = .54, p < .05$) The child gives his story a title.

#10 ($r(16) = .52, p < .05$) The child manipulates sounds and rhythms of words in his writing.

#18 ($r(16) = .49, p < .05$) The child uses subordinate clauses and phrases in his sentences.

DISCUSSION

Differences in syntactic complexity did seem to affect the readability of the cloze passages as indicated by the percentage of correct restorations. Few of the subjects satisfactorily comprehended the passage written with a mean T-unit length eight words longer than that of their productive language (PL + 8). The mean score on this cloze passage was 37% correct restorations. If one accepts Bormuth's criterion of 44% for instructional level, this passage would be considered somewhat difficult for these students. On the other hand, all groups could better comprehend the passage written at their productive level. Their mean score indicated 60% correct restorations.

In this study it appears that the sentence expansion practice did have some effect on experimental group students' reading comprehension. After treatment these students were able to comprehend a passabe written at their productive level (PL) and a passage written above their productive level (PL + 4) equally well. All other groups found the second passage more difficult to comprehend. It seems then that the sentence expansion practice had the effect of improving students' ability to comprehend syntactically complex material. This finding would seem to be in accordance with Fodor's "analysis by analysis" model.

The sentence expansion treatment appears to have improved students' reading comprehension of passage PL + 4 but not of passage PL + 8. This could mean that the treatment could only improve comprehension of complex syntactic structures up to a certain level of difficulty. Another possibility is that in the cloze passage PL + 8 which was rewritten to have very long T-units, the language was somewhat unnatural or contrived and may therefore have been difficult to understand.

The sentence expansion practice appears to have little effect on the arhetorical measures of mean T-unit length. Other researchers have found a significant increase in this variable after sentence expansion practice (O'Hare, 1973; Combs, 1976; Fisher, 1976; Miller and Ney, 1968). A possible reason for the nonsignficant results in this study is that compositions may not have been of adequate length to assure a high degree of reliability. In addition, it is possible that, although all compositions were in the narrative mode, there were differences in mean T-unit length within subjects that were related to their selection of writing stimuli. Furthermore, it is possible that in the sentence expansion lessons in this study the emphasis was on discovering the relationships among deep structure and surface structure, while other investiagors may have emphasized the production of complex structures. The fact that sentence expansion practice appears to have influenced reading comprehension but not mean T-unit length is in accordance with other findings indicating that comprehension proceeds production of complex structures (Fraser, Bellugi and Brown, 1963).

In compositions produced by the experimental group a weak relationship appeared between rhetorical and arhetorical factors since long T-units were not necessarily associated with high Sundbye ratings. The factors identified as being significantly correlated with total Sundbye ratings reflect the writer's ability to organize ideas, to avoid egocentricity, and to manipulate words for certain effects. It also indicates use of transformations which resulted in the use of modifiers, phrases and clauses.

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CLOZE PROCEDURE AS A COMPREHENSION MEASURE IN GRADE TWO

Cloze procedure involves the patterned or random deletion of words from a passage of written text. A difficulty rating for the passage is obtained by counting the number of blanks filled in, typically counting as correct only those filled in with exactly the same words used by the author of the passage. Taylor (1953) suggested that cloze procedure was an effective way of determining the comprehension difficulty of a passage, and cloze has been utilized, by some, as a readability measure. It is common practice to count only the exact words, no synonyms as correct. Jongsma (1971) summarized a great deal of cloze research and concluded that deciding what substitutes to accept was not worth the effort and, that accepting substitutes did not significantly affect the results obtained.

Cloze has been much more widely used with proficient readers than with beginners, probably for such obvious reasons as the limited reading and writing skills of beginners. However, the Spaches (1977), among others writing in the area of reading instruction in the elementary school, advocate the use of cloze in estimating the child's functional reading level, because it ". . .eliminates the difficulty of creating comprehension questions that really function" (p. 340). In her dissertation study, Ransom (1961) found cloze to be a reliable technique for establishing pupils' reading levels, grades one to six. Schoelles (1971) found cloze to be an effective predictor of reading achievement test scores, and further, that more difficult cloze passages appeared to produce greater dispersion of scores. Hicks (1974) found high, positive correlations between scores of elementary school pupils on standardized reading achievement tests and on the cloze passages she developed. Numerous studies have utilized cloze procedure with intermediate grades, high school and college students.

A careful review of the literature reveal no studies in which cloze passages were taken from basal reader selections. Because basal readers are so widely used, additional evidence regarding the difficulty level(s) of basal selections would be very useful to teachers, authors, and publishers. It seems possible that cloze could provide at least as reliable and probably a more realistic measure of the match between reader and reading material than the more frequently used readability formulas.

The purposes of the study reported here, then, were to answer the following questions:

1. What is the relationship between pupils' scores on standardized tests of reading achievement and their scores on three types of cloze passages?
2. Does the acceptance of words substituted for the exact words used by an author affect pupils' scores on those three passages?
3. What is the relationship between the assigned reading level of basal materials and pupils' performance on cloze passages taken from that basal?

METHOD

Procedures

All second graders (N = 109) enrolled in a midwestern suburban school system participated in this study. Three sequential passages from the Ginn 360, Level 8, text, *How It Is Nowadays,* were selected for the cloze procedure. *How It Is Nowadays* was part of the school system's adopted basal series, but the subjects had not yet read the selection from which the cloze passages were taken.

Three types of deletions were used; in the first passage only function or structure words (of, by, for, the) were deleted, in the second, verbs were deleted, and in the third, the standard every-fifth-word deletion pattern was utilized; this sequence was based on the results of a pilot study with a different group of second grade pupils. Selections were approximately one hundred words long, and each included twenty blanks. A primary typewriter was used and the spaces to be filled in were identical in length (ten spaces).

The "tests" were administered by the writer and/or her research assistant. The classroom teachers were present for all three sessions and they assisted in spelling the words the children wanted to use but couldn't spell; this was the only help given to the children. No time limits were set, but each passage was completed by all pupils in less than thirty minutes. The passages were hand scored, each one twice, for greater accuracy. Two scores were assigned, one for the exact words, the other for "acceptable substitutes." (A colleague in reading and linguistics corroborated, or refuted the writer's judgement about which substitutes to accept). Substitutes were always of the same form class as the exact words, but in the case of verbs, tense variation was accepted.

The classroom teachers administered the *Iowa Test of Basic Skills,* (Level 8, Form 5, 1972), as they do routinely in this school system, and the tests were machine scored.

RESULTS

Correlations for the two scoring procedures were highly positive: .981 for function words, .977 for verbs, and .923 for every fifth word. Mean completions were 10.789 for exact function words (approximately 55%), 11.889 (approximately 60%) for substitutes. For verbs, 10.807 (approximately 55%) and 11.935 (approximately 60%); for every fifth word 10.816 (approximately 55%) and 12.697 (approximately 65%).

Indepedent variables were scores on the three cloze passages; dependent variables were the Vocabulary, Word Analysis, and Comprehension subtests of the Iowa, and analysis were by means of a stepwise regression. Both sets of cloze scores were used, and results are reported in Table 1.

These correlations can be described as moderate, at best. They certainly are not as high as had been expected. There appears to be no observable pattern of relationships between the achievement test and scores on the three types of passages.

It has been commonly accepted (Rankin and Culhane, 1969) that correctly completing 60% of the blanks is indicative that the material is written at the pupil's instructional level, the level at which one would expect basal reader material to be written. Scores varied from a completion rate of 55% to 65%,

TABLE 1

Pearson—Product Moment
Correlation Coefficients

Iowa Test of Basic Skills, Cloze Test Scores

Cloze Scores	**Achievement Subtest Scores**					
	Vocabulary Subtest		**Word Analysis Subtest**		**Comprehension Subtest**	
Cloze Type	**Exact Word**	**Acceptable Substitute**	**Exact Word**	**Acceptable Substitute**	**Exact Word**	**Acceptable Substitute**
Function Word	.479	.486	.506	.518	.537	.528
Verbs	.585	.565	.610	.585	.560	.553
Every Fifth Word	.595	.590	.589	.596	.512	.512

Note: In all cases, $p < .001$.

suggesting that the material was appropriate for these children. However, in view of the socio-economic backgrounds of these children (average to high) and their intelligence test scores (Otis Lennon, mean I.Q. 115), it seems that better performance might have been expected (and was, in fact, predicted).

The syntax of the passages selected seemed especially complex, and it can be hypothesized that the ellipses, and numerous dependent and independent clauses, caused some problems. These children had completed many workbook exercises involving cloze-type responses, so it is unlikely that the procedure itself presented any significant difficulties. The reader can judge whether or not the pupils' performance was satisfactory; in the writer's opinion, it was somewhat less than had been anticipated.

SUMMARY AND IMPLICATIONS

To summarize: In terms of the three stated purposes of this study, it can be said that:

1. The relationship between scores in the cloze passages and scores on reading sub-tests of the *Iowa Test of Basic Skills* is moderate. This was not what had been predicted on the basis of the literature review.
2. Acceptance of other than exact words does not result in a significant change in the scores on these passages. Correlations between the two sets of scores were positive and high. This lends further support to Jongsma's (1971) conclusion.
3. The three types of cloze passages were not demonstrably different in difficulty level, if percentages of correctly completed blanks can be considered a reliable measure of difficulty.

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CHILDREN'S COMPREHENSION OF PICTORIAL AND TEXTUAL EVENT SEQUENCES

Typical reading research has measured comprehension of a passage through story recall (Goodman & Burke, 1973) or responses to both literal and inferential type questions. More recently researchers have examined the effects of varied text structures upon story comprehension (Thorndyke, 1977; Frederiksen, 1975). The present investigation assessed comprehension in yet another manner, through a logical decision task. Children were presented a short sequential story called an event and asked to make judgements about corresponding test items. In this manner, it was felt that an evaluation could be made of the extent to which a story theme was abstracted and used as a criterion for judging test items as logical or illogical.

Prior research involving event sequences has manipulated test pictures in a recognition type task (Jenkins, Wald & Pittenger, in press; Brown, 1976). Students were to identify pictures as "old" (previously shown in the sequence) or "new." Consistent with the Bransford and Franks (1971) paradigm, specific memory for individual pictures was lost; the pictures of the sequence were integrated in memory in the form of one coherent story theme. Thus when the children falsely identified new test pictures congruent with the event, it was taken as evidence that the theme of sequence had been abstracted and integrated in memory (i.e. comprehended). This investigation differs from previous research by examining theme abstraction through a decision task rather than a recognition task allowing a tighter evaluation of theme abstraction. In addition, event mode and reading ability were independent variables manipulated to determine the nature of this abstraction. Response differences which might occur as a result of these factors could suggest differential processing of pictures and text or differential processing strategies between good and poor readers.

METHOD

Subjects

Thirty-six 4th grade students from a suburb of St. Paul, Minnesota participated in the study. They were grouped according to reading ability. Good or poor readers were identified by vocabulary and comprehension test scores on the *Iowa Test of Basic Skills*.

Stimuli

The events from which the pictures and sentences were developed consisted of three sequential activities familiar to children. The paradigm for generating the events was based upon materials developed by Jenkins et al. (in press) and Brown (1976). Familiar sequences were chosen to maximize memory for what was seen or read and to enhance students' ability to abstract an event and establish relationships between and among event items. The three event sequences selected were: drawing a picture, putting on outdoor

115

winter clothing, and checking out a library book. Seven slides per sequence were taken. After an event was photographed, two additional slides were taken. These slides maintained the same character and environment, but violated event content by manipulating stimuli within this environment in a manner inconsistent with the sequence. An example of an inconsistent item from the "drawing a picture" sequence was the framing of a blank sheet of paper.

One sentence narratives were written to correspond to each slide comprising the event. Independent judges cross validated the narratives for semantic equivalence with the pictures by selecting slides which best described the sentences. Following this validation process, the sentences in each sequence were slightly modified so that across sequences each sentence occupying a given place in the sequence contained the same number of words and propositions (Kintsch, 1974) as its counterpart in the other sequences. In this manner, the number of idea units expressed across sequences was systematically controlled.

Each event sequence contained five pictures or sentences. In the test condition each test set consisted of eight items. Four items were from the original event sequence (i.e. old) and served as controls. The other four test items were "new." Two were a part of the original sequence photographed thus consistent with the event and labeled "high fit" items. Two other test items were "new" however, inconsistent with the event sequence and labeled "low fit" items.

Design and Procedure

The experimental design was a 2x2x3 factorial. Two between subjects variables were ability (good and poor readers) and mode of presentation (pictures or text). A third variable, sequence, was a within subjects factor. The analysis of new item responses introduced a fourth variable, item fit (high fit, low fit) as a within subjects factor. Students were blocked on reading ability and stratified randomly into one of two modality conditions. They were presented all three events in a fixed order then given corresponding test items. Presentation and testing were conducted in the same mode. Students indicated on scoring sheets which test items logically fit with the event sequences presented.

After testing, informal interviews were conducted with the students to determine their rationale for decision-making.

RESULTS

An analysis of variance of responses to old test items revealed a significant ability effect, $F(2,30) = 11.82$, $p < .001$. Good readers were more accurate at identifying old test items as logically belonging with the event sequences than poor readers. However, no ability effect was present for responses to new items.

A significant main effect for mode of presentation did occur for new item responses, $F(2,30) = 32.44$, $p < .001$. Students were less accurate at identifying inconsistent slide pictures than inconsistent sentences.

New item responses also differed significantly across event sequences, $F(2,60) = 43.42$, $p < .001$. More belonging responses occurred in Sequence 1 than in Sequences 2 and 3. Neuman-Keuls contrasts revealed that no significant difference occurred between responses in Sequences 2 and 3. A follow-up test in which order of presenting events was reversed (3-2-1) revealed that differential responses to Sequence 1 were due to order effects. Serial position of the event resulted in tighter "fit" criterion. More errors of judgment occurred with the first than the last event.

A significant main effect was obtained on item fit, $F(1,30) = 52.32, p < .001$. Both good and poor readers were able to distinguish new items as consistent or inconsistent with the event sequences. The mean score for high fit items was $M = 1.19$ while the mean score for low fit items was $M = .56$.

An ability by mode interaction was found, $F(2, 30) = 15.17, p < .001$. In the picture condition both good and poor readers had difficulty identifying new inconsistent items as not belonging. Mean scores responses for good and poor readers were $Mg = 1.72$ and $Mp = 1.06$ respectively. Poor readers also had difficulty identifying inconsistent sentences, $Mp = 1.11$. Good readers however, were highly accurate at making belonging decisions in the text condition, $Mg = .47$.

DISCUSSION

These results indicate that both good and poor readers were able to identify "new" test items as consistent or inconsistent with the event sequences. These findings are evidence that event themes were comprehended; individual sequence items were integrated into a coherent theme. Differences were present in the children's ability to make judgments across presentation modes. Pictures elicited a much looser criterion for belonging judgments than sentences as evidenced by errors made by both good and poor readers when identifying inconsistent picture items. Perhaps these differences are due to the implicit-explicit nature of the stimuli. For example, inconsistent sentences stated negation such as *unframed, dropped* and *forgot*. By contrast, these changes had to be apprehended in the pictures and interpreted within the framework of the preceeding event sequence.

It should be noted that even with the more precise text, poor readers continued to make judgment errors in this condition. Perhaps this effect is the result of attentional limits which could have resulted in decreased comprehension of the text (LaBerge & Samuels, 1974). In general, task practice increased precision of judgment across presentation modes for both good and poor readers.

CROSS MODAL STUDIES

Additional follow-up investigations were designed to make new comparisons and to examine children's judgments about event sequences when presentation and testing modes differed. It was felt that these new comparisons would allow examination of children's decision-making abilities from one mode to another, allow comparisons with the earlier decision task, and might suggest implications for instruction.

Utilizing the same materials, the comparisons studies included: 1) a pictorial presentation mode and textual test set (PT) and 2) a textual presentation mode and pictorial test set (TP). For comparison purposes, only good readers participated in the study to minimize possible confounding that might result from poor decoding skills.

RESULTS AND DISCUSSION

The following presentation and testing comparisons were made on both old and new item responses: PP, TT, PT, TP. An analysis of responses to old items revealed no significant differences between all four investigations. However, analysis of new item responses indicated a significant main effect for item type across all comparisons and a significant difference among responses in the PP, TT, PT comparisons studies and the TT, TP studies. To further illustrate these differences, Table 1 lists all of the mean responses for both high fit and low fit items in each comparison study.

TABLE 1

Mean Responses to New Items
(maximum score for new items = 6.0)

Experiment	High Fit	Low Fit
PP	5.667	4.667
TP	4.667	2.500
PT	4.667	.167
TT	2.333	.500

NOTE: For each item a 1.0 rating represented a logical fit with the sequence while a 0.0 rating represented an illogical fit.

As one goes from a totally pictorial to a totally textual situation, the number of belonging judgments decreases for both high fit and low fit items. Also textual testing (PT) increases the precision of correct judgments for low fit items more than textual presentation. In short, there appears to be some additive increase in belonging judgments associated with the presence of pictorial stimuli and this effect is even more pronounced for low fit items. Pictures seem more subject to multiple interpretation than text, but more so when they appear as recognition test stimuli than as presentation stimuli.

IMPLICATIONS

Contrary to past research utilizing pictures, these findings imply that pictures do not always facilitate learning nor are merely adjuncts to text (Samuels, 1967). However, the role of pictures remains somewhat ambiguous; even good readers had difficulty extracting appropriate information and making judgments about pictorial stimuli. In addition, psychological research indicates that the nature of information extracted from a picture is unclear (Mandler & Robinson, 1978). Consequently, it appears imperative that when pictures are used as a part of instruction, key concepts need to be identified and their relationship to the contents of the picture discussed. One should not assume that children, particularly poor readers, are capable of apprehending and integrating pictorial information on their own. Further research establishing the semantic and salient dimensions of pictures needs to be conducted to determine their most advantageous use during instruction.

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ORGANIZATIONAL PATTERNS IN PROSE AND THEIR USE IN READING

Question: Is Following the Structure of Text an Important Reading Skill?

The National Assessment of Educational Progress (1973) reports that many poor readers are able to read and understand words and sentences but are unable to learn from texts. The readers have mastered primary decoding skills, but not the higher-order skills involved in proficient reading comprehension. Many investigators (cf., Schreiner, Hieronymous, & Forsyth, 1969) suggest that reading comprehension consists of more than a wholistic skill. Davis (1944) used a factor analytic method to identify the comprehension skills of remembering word meanings, following the structure of a passage, finding answers to questions, drawing inferences from content, and recognizing the author's purpose, attitude, tone, and mood. More recently, Spearritt (1972) identified four separate skills in reading comprehension: recalling word meanings, drawing inferences, recognizing the author's purpose, attitude, and mood, and following the structure of a passage.

These lists of factors constituting prose comprehension include the skills of following the structure of the passage and recognizing the author's purpose. Most research has neglected these skills and focused on the other factors (Carroll, 1971; Caterino, 1977). Consequently, few programs have been developed to teach these skills. The training programs (Gainsburg, 1967; Niles, 1965; Sack-Yourman, 1965) which do exist have not been formally evaluated for their success in teaching these skills nor for the relationship between improvement in these skills and overall improvement in comprehension.

My own research has pursued the effects of structure in text on what people remember from it (Meyer, 1971; Meyer & McConkie, 1973; Meyer, 1975; Meyer 1977a, 1977b, 1977c). Structure in text was identified by a propositional analysis (Meyer, 1975) of text into a hierarchically arranged tree structure called the content structure. One finding of this earlier research was that information located at the top levels of the content structure is recalled and retained better than the information at lower levels in the content structure. Propositions at the top level of the content structure correspond to what educators have called main ideas, while those at the lower levels correspond to what have been called details. This effect of structure has been confirmed with various types of materials, recall tasks, and subjects (Kintsch & Keenan, 1973; Mandler & Johnson, 1977; Meyer, 1977a; Thorndyke, 1977).

A second finding (Meyer, 1975) of this earlier work relates more closely to the skill of following the author's structure. The pattern of relations at the top levels of the content structure was found to dramatically influence the selection and retention of ideas located at the top level in the structure, while the pattern of relationships low in the structure had no influence on recall. A third finding (Meyer & Freedle, in preparation) showed that manipulating the extreme top-level structure in text while leaving everything else constant affected recall and retention of the text.

These findings show the influence of the top-level prose structure upon what and how much is learned from reading. Configurations at the lower levels in the content structure did not seem important for predicting recall. These results have important practical implications. A detailed structural analysis (Meyer, 1975) of text is very time consuming and impractical for reading teachers. However, an analysis of the top levels of text is less involved and could be performed by educators to construct equivalent forms of reading tests and to prepare materials that teach reading and writing skills.

New Tools to Identify the Top-Level Text Structure

Due to a lack of tools for objective identification of text structure and author's purpose, few studies have examined the reading skills involved. In recent years, a number of prose analysis systems have been developed by psychologists (Frederiksen, 1975; Kintsch, 1974; Meyer, 1975), derived from work in linguistics (Fillmore, 1968; Grimes, 1975; Halliday, 1967; van Dijk, 1976). The various prose analysis systems address different research questions while sharing others. The system I employ (Meyer, 1975) seems well suited for examining the skills in question here.

The top level in the hierarchical content structure resulting from an analysis of a text depicts the major rhetorical relations used by the author to organize his/her text. Passages can be classified into different types of expository text on the basis of differences in this top-level structure (Meyer, 1977a). Meyer and Freedle (in preparation) examine the following top-level rhetorical structures: *response*, which relates a problem (or question) to a solution; *adversative*, which relates what did happen to what did not, or a favored view to an opposing view; *covariance*, which relates an antecedent condition to its consequent; and *attribution*, which relates a collection of attributes to an event or idea. This research with college students showed that adversative and covariance structures yielded better recall and retention than attribution structures. The purpose of an author of expository text can often be identified by examining the content and relationships at the top third of the content structure; the propositions at this level of the structure embody the author's message, the primary ideas or thesis being posited.

Thus, tools are now available to investigate further the reading comprehension skills identified by educators. This area of investigation is of potential value not only for its practical applications, but for clarification of aspects in the reading comprehension process.

Relating the Question to a Model of Reading Comprehension

Investigators from varied backgrounds (Adams & Collins, J. Anderson, 1976; Anderson, 1977; Rumelhart, 1977; Rumelhart & Ortony, 1977; Meyer, 1977b; Schank & Abelson, 1977; van Dijk & Kintsch, 1977) adhere to the idea that schemata play a central role in comprehension. Rumelhart and Ortony (1977) have outlined schema theory. Briefly, schemata are knowledge structures which can embed to form networks and vary in their degrees of abstraction. Schemata have variables which can be bound with different content. Schemata are believed to function during encoding of prose, making inferences, and retrieving information about a passage from memory. The model of reading comprehension based on schema theory proposed by

Rumelhart (1977) views reading comprehension as the process of choosing and verifying conceptual schemata to account for the text to be understood.

I argue that skilled readers have a finite number of schemata which are used in text comprehension. Story schemata for comprehending narratives have been discussed before (van Dijk & Kintsch, 1977; Rumelhart, 1975). Schemata used in classroom texts of expository nature have been less often studied. They would apply to the four text types described in research by Meyer and Freedle (in preparation) as well as to other types based on the rhetorical predicts set forth by Grimes (1975). These schemata are more abstract and general than schemata for such things as restaurant, face, or building a house. Anderson (1977, p. 416) also identifies the top-level structures of text as schemata. He states "the structures by which an author gives a high level organization to a text . . . are schemata, as are the complementary ones by which readers detect this organization and use it as ideational scaffolding for detailed information."

It is hypothesized that the skilled reader approaches text with knowledge of how texts are conventionally organized. For a particular text, the reader selects the schema in her/his repertoire that best accounts for it. Aspects of the text structure and signaling words in the text such as "the solution is" (Meyer, 1975), suggest which schema can be best employed; the exact process by which this occurs has not been explicated. The schema employed to comprehend the text functions like an outline. For example, a reader who brings the response schema to the text will be watching for content to bind the variables of problem and solution. When recalling the text, the skilled reader activates this same kind of superordinate response schema which began the encoding and retrieves the information stored in memory about the text through a top-down search.

The schema-theoretic model of reading comprehension is compatible with the view of reading as a conversation between an author and a reader (Grice, 1967). Authors have a general notion of what they intend to communicate to their readers and what their readers already know (van Dijk, 1977). This influences the content they present, the manner in which they organize content, the signaling or emphasis they place on certain content and relationships, and the inferences readers are assumed able to make. At the other end, readers come to the text with varying perspectives, purposes, skills, and knowledge. In order for the interaction between the author and the reader to be productive, it should follow the pragmatic constraints of conversational behavior (Grice, 1967); there must be cooperation between the author and the reader. The author should be sensitive to the attributes of the reader and the readers should seek to recover the purpose of the author as they relate the text to their own knowledge system for their own purposes (Johnson, 1975; Bruce, 1977). Thus, if the reader recognizes the author's organization or top-level structure of a passage, the conversation will be more successful and the reader will get the author's message.

My students and I, in accordance with the insight of reading specialists, assume that an important strategy for reading comprehension is the ability to identify and use the top-level structure of text for both encoding and retrieval. In processing the text, the skilled reader will use the same type of superordinate schema as that used by the author in writing the text. This assumption holds for well-organized texts. With prose that has been scrambled or lacks organization, skilled readers improve their comprehension by providing a schema to organize the input; Kintsch, Mandel, and Kozminsky (1977) found that this is, in fact, what college students do with scrambled stories.

Our research shows that even seemingly well-organized text materials differ in quality of organization, affecting quantitative recall. When diagrammed, the adversative (comparison) and covariance (causal) structures of those materials have one more link of relationship as compared to the attribution (list) structure. In Anderson's (1976) ACT model, the probability of retrieval from memory is increased by links among propositions. In accord with our interpretation of this network model, recall should be greater for adversative and covariance passages if readers utilize these top-level structures for encoding and retrieval. The same prediction would be made from a schema theory orientation. Each of the three structures conveys to the reader that some ideas will be presented on a topic. However, the adversative and covariance structures also provide an additional schema: the ideas presented will be opposing in the adversative passage and they will be causal in the covariance passage. Our data support the prediction.

However, the poor readers identified by the National Assessment study may not come to a text with the knowledge that authors organize text with such structures as adversative or covariance. They may have a notion of story schema (Mandler & Johnson, 1977), but lack knowledge of schemata used in expository text. Their primary expectation when approaching expository text may be that the text lists some things to remember. These readers will probably not be able to utilize a superior structure like the adversative structure, and may perform better on the attribution structure which resembles the list-like schema that they bring to the text.

Readers utilizing the top-level structure of well-organized text will have advantages over readers not using this strategy at both the encoding and retrieval stages. For example, readers using an adversative schema in their processing of text will look for the two opposing views presented, contrast them on their points and counterpoints, and try to evaluate why one is favored by the author over the other. Readers using this adversative schema should be processing the information more deeply than readers trying to recall a list of ideas stated by the author. During retrieval, poor readers who use a list strategy will search memory for attributes of the topic of the passage. Recalling one attribute will not necessarily cue another. In contrast, readers who use an adversative schema will have a more systematic retrieval plan. Using the adversative schema ensures the reader of recalling both views presented in the text, as well as many stored subordinate propositions located in a top-down retrieval search. If they recall one point for one view, it will often facilitate the retrieval of the corresponding point for the other view or prompt the reconstruction of the point if the details have been forgotten.

Utilizing the same top-level structure as that used in the text should be of even more assistance as time elapses after reading. Immediately after reading a passage, vivid content from propositions low in the hierarchical structure will be more readily available for recall than after a delay of a week (Meyer, 1975). Readers using this systematic retrieval plan should show a still greater advantage over readers not using this approach on delayed recall tasks after low-level details have been forgotten.

Answer from Several Studies: Following the Top-Level Text Structure Appears to be an Important Reading Skill for Ninth Graders

Observational Studies

My students and I have empirically examined the value of following the author's top-level structure in texts. The first study (Meyer, Brandt, & Bluth, 1978) examined the use of the top-level structure in text by ninth graders gauged as good, average, and poor comprehenders on standardized reading comprehension tests. Two well-organized passages were selected: one text with an adversative top-level structure and one (taken from a junior high magazine) with a response: problem/solution top-level structure. Use of the same top-level structure or schema as the author used in the text was measured by assessing the top-level structure of the free recall protocols written by the students immediately and one week after reading the passages. A recognition test was also given at the delayed testing.

The data revealed four important findings about ninth grader's use of the author's top-level structure. First, slightly less than 50% of our ninth graders utilized this strategy in their reading. Second, most ninth graders rated by their teacher and by standardized tests as good in reading comprehension used the same top-level structure for organizing their recall protocols as the author of the passage, while most students rated poor in reading comprehension did not. Third, students who employed this strategy of using the author's textual schema recalled much more information from passages than those who did not; use of the author's top-level structure accounted for 44% of the variance in recall immediately after reading passages and 68% of the variance in recall one week later. Fourth, students who use this strategy could discriminate better between information consistent with the meaning of the passage and intruded information on the same topic.

These data support the facilitative properties hypothesized for the systematic, top-down process of retrieval via top-level text structure. Top-down search should provide superior recall of information at all levels of the content structure and particularly of information at the top levels of the structure where the retrieval process begins. The content structures of the passages used in the Meyer, Brandt, and Bluth (1978) study were divided into three levels to examine the differences in processing different types of information between students who did and did not utilize the top-level structure of text.

Each of the content structures had six levels in their hierarchy of propositions. Levels one and two in the content structures of the passages were the most crucial propositions to the overall meaning of the text and labeled the message. The major details were identified as those propositions located at levels three and four in the content structure, while the minor details included all propositions located at levels five and six in the content structure.

The following depicts the message, major details, and minor details from the passage with the response top-level structure on the top of supertankers. The capitalized words are the message. The underlined words are the major details; the words in italics are minor details.

124

SUPERTANKERS

A PROBLEM OF VITAL CONCERN IS THE PREVENTION OF OIL SPILLS FROM SUPERTANKERS. A typical supertanker carries a half-million tons of oil and is the size of five football fields. A wrecked supertanker spills oil in the ocean; this oil kills animals, birds, and microscopic plant life. *For example, when a tanker* crashed *off the coast of England, more than 200,000 dead seabirds* washed *ashore.* Oil spills also kill microscopic plant life *which provide food for sea life and produce 70 percent of the world's oxygen supply.* Most wrecks result from the lack of power and steering equipment to handle emergency situations, *such as storms. Supertankers have only one boiler to provide power and one propeller to drive the ship.*

THE SOLUTION TO THE PROBLEM IS NOT TO IMMEDIATELY HALT THE USE OF TANKERS ON THE OCEAN since about 80 percent of the world's oil supply is carried by supertankers. INSTEAD, THE SOLUTION LIES IN THE TRAINING OF OFFICERS OF SUPERTANKERS, BETTER BUILDING OF TANKERS, AND INSTALLING GROUND CONTROL STATIONS TO GUIDE TANKERS NEAR SHORE. First, officers of supertankers must get top training in how to run and maneuver their ships. Second, tankers should be built with several propellers *for extra control* and backup boilers *for emergency power.* Third, ground control stations should be installed at places where supertankers come close to shore. These stations would act like airplane control towers, guiding *tankers along busy shipping lanes and through dangerous channels.*

Use of the top-level structure yielded significantly superior recall on message, major details, and minor details for both passages immediately and one week after reading, and it was particularly crucial for recall of the message. Readers using this strategy showed little forgetting of the author's message over the week interval; this was not the case for those who did not use this strategy. Thus, those who use this strategy had a much better criterion on the delayed recognition test for judging if an item related to the text's topic had actually been stated in the text. It is plausible that those who used the top-level structure of the text on the immediate recall task but not on the delayed task surpass the performance of those who use it on both tasks because the former group integrates the information into different prior knowledge structures. However, the data revealed that those who use the top-level structure immediately but not a week later performed on the immediate free recall test very similarly to the group that consistently used the top-level structure, and on the delayed test performed like the group that never used the strategy. This finding suggests that use of the top-level structure is particularly important for facilitating a systematic top-down retrieval strategy.

The strong relationship between amount of information remembered from a text and the use of the text's top-level structure has been found in all of our studies with ninth graders, junior college students, and retired adults. A study with graduate students reading the passages used by Meyer, Brandt, and Bluth showed that all of the students utilized the author's top-level structure; 50% of a test group of junior college students used the strategy on more difficult materials (Meyer, Bartlett, & Woods (1978)), while 70% of Cornell University undergraduates employed the strategy on these materials.

With over 300 ninth graders tested on seven different passages (Bartlett, 1978; Brandt, 1978; Meyer, Brandt, & Bluth, 1978), the variance accounted for in recall by use of the author's top-level structure ranges from 36% to 52% in immediate recall to 68% to 80% for delayed recall one week later. However, on a highly familiar topic (Brandt, 1978), the amount of variance accounted for on the immediate recall test was 22% and 30% one week later. With extensive prior knowledge of a topic, the propositions from the passage are probably integrated into propositions stored in memory. The rich network on the topic may provide many cues and links (Anderson, 1976) which facilitates recall independently of the use of the author's top-level structure. Although the effect of this strategy was reduced for the highly familiar topic, students who used the strategy still performed better than their peers who did not use the strategy.

Experimental Studies

The correlational data from the previous studies strongly suggested the possibility of a causal relationship between following and utilizing the author's top-level structure in text and then how much and what can be remembered from it. Dissertations by two of my students were designed to investigate this causal relationship.

One of the dissertations (Brandt, 1978) examined whether or not a short advance organizer focusing on the top-level structure of text would facilitate ninth graders' recall of adversative and attribution passages. The advance organizer consists of an explanation of the structure of the passage to be read and an outline of its top-level structure. It had no effect on the ninth grader's learning and retention of the passages. However, use of the author's structure was the best predictor of recall, supporting the findings of the original study.

A possible explanation for lack of significant main effects in this experiment is that this type of advance organizer given to facilitate use of the top-level structure did not provide enough information to bridge the gap between the top-level structure of the passage and the ninth graders' cognitive structure related to strategies for learning from text. Perhaps an advance organizer of this type would be helpful for more sophisticated readers on more difficult passages, but for these students it was not effective. Thus, an extensive training program for ninth graders on identifying different types of top-level structures found in classroom texts appeared to be the next step.

The second dissertation (Bartlett, 1978) examined the effects of teaching ninth graders to recognize commonly found rhetorical structures on their ability to identify and use these structures in their own recall protocols and the amount of information they could remember. The duration of the instruction was one hour a day for five consecutive days. The instruction focused on how to identify and use four commonly found top-level structures in classroom text: adversative, covariance, response, and attribution. Special aids for identifying the top-level structure were faded out over the week of instruction and the study passages increased in complexity; most of the instruction passages were taken from textbooks written for junior high school students.

Students in the training group and control group read and recalled passages prior to the training, one day after the training program, and three weeks after the completion of the program. The instruction led to significantly increased identification and use of the top-level structure of passages and an increased amount of information recalled. The amount of information recalled by the instructed group on each of the posttest sessions was nearly double that of both their pre-instruction scores and the scores for the control group for all testing sessions. The instruction benefited students with high, average, and low vocabulary scores on the *Stanford Achievement Test* (SAT). The effects of instruction were maintained three weeks after the training program by nearly all of the students except those with SAT vocabulary scores below the 12th percentile on national norms (2% of the students given the training); these students showed an initial benefit from instruction but it was not maintained three weeks later. This study indicates that use of the top-level structure in prose is an important reading strategy and can be taught to most ninth graders.

In summary, the research studies discussed have empirically shown the importance for reading comprehension of following and utilizing the top-level structure in texts. The data provide insights into the cognitive processes involved in reading comprehension and support models of reading comprehension incorporating schema theory. The findings and text analysis procedures have important practical implications for educators teaching reading comprehension. Further research is needed on the application of this strategy to different prose forms of various difficulty levels by readers of different ages.

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ETIOLOGY OF READING COMPREHENSION STYLE

A body of empirical data has been accumulating recently indicating radical differences between individuals in reading comprehension style (cf. Spiro & Tirre, 1979; Spiro, 1978). The theoretical framework guiding this research characterizes reading comprehension as involving an interaction of text-based processes and processes related to the existing knowledge schemata evoked by the text and its context of occurrence. (For discussion of this orientation, see Anderson, 1977; Bobrow and Norman, 1975; Bransford and McCarrell, 1975; Cofer, 1977; Rumelhart, 1976, in press; Rumelhart and Ortony, 1977; Schank and Abelson, 1977; Spiro, 1977, in press). Whereas early research on schema-theoretic processes of understanding carried an implicit assumption that all skilled language users processed discourse in essentially the same way, it now appears that that is not the case. Experiments conducted by Spiro and his colleagues indicate substantial differences between individuals in their patterns of resource allocation to text-based (bottom up) versus knowledge-based (top down) processes (see Spiro, 1978 for a review of this research). for skilled readers (adult and child), there are tendencies for an individual to employ more processes in a preferred direction (bottom up or top down) when characteristics of the situation permit processing in one direction to substitute for processing in the other without affecting ultimate performance. For children who are less able readers, there are tendencies to *overrely* on processes in one direction, producing deleterious effects on comprehension.

What underlies such uni-directional biases in discourse processing style? At this point, the answer must be a blend of data (where it is available) and informed speculation. To provide a hint of the complexity that may characterize the eventual answer, possible sources of overreliance on text-based or bottom up processes only will be discussed. It should be noted that the list is not intended to be either exhaustive or composed of mutually exclusive causes.

FACTORS UNDERLYING OVERRELIANCE ON BOTTOM UP PROCESSES

Schema Availability and Activation

The most obvious cause of an overreliance on the text in comprehension is the absence of relevant knowledge structures to utilize in top down processing — if schemata do not exist they cannot be used. However much the vocabulary and syntax of a physics text are simplified, it is unlikely fifth graders will successfully comprehend it without first acquiring the requisite background of scientific knowledge.

It should be noted, however, that schema availability alone is not a sufficient condition for adequate comprehension (see Experiments II-IV in Bransford & Johnson, 1972). Relevant schemata must be activated. The

129

processes by which schemata are evoked are not well understood at this time. However, it appears likely that problems of schema accessibility will be greater for written than oral, conversational discourse. The latter is typically embedded in a rich nonlinguistic context which frequently signals the schemata needed to be activated. If not, the hearer may directly query the speaker (at one extreme, "What are you talking about?"). Written discourse, on the other hand, is relatively decontextualized. Clues to which schemata need to be activated usually must be divined from the text alone; if problems arise, the text cannot be queried (for further discussion of decontextualization, see Rubin, in press; Spiro, in press).

The problem of schema activation is further complicated by the level of generality typical of children's knowledge structures. Schemata tend initially to be tied to their contexts of acquisition, rather than achieving a generality permitting application to a broad range of structurally similar situations (Nelson, 1977). For example, the present writer encountered a child having difficulty understanding the well-known "Stone Soup" fable, wherein a beggar is refused food by the servants of a house and then contrives to deceive them into giving him food. The child failed to appreciate the "conning" element of the story, despite manifesting an understanding of that concept in a subsequent interview. The problem was that the "conning" schema was insufficiently general; the child understood conning as it applied to his own personal experiences with trying to gain satisfaction deceptively after being thwarted by those with authority. However, that knowledge could not be applied to an appropriate case that was somewhat alien to personal experience.

A related problem concerns the use of schemata by analogy. We can not have a pre-packaged knowledge structure to inform every situation we encounter. However, structural similarities can often be detected between domains which are well-represented in prior knowledge and domains lacking such representation. In these cases, the existing knowledge structures may be transformed and adapted to fit the new domain. Instances of this phenomenon are common in the history of science, for example. Consider how knowledge about pumps informed the developing understanding of the human circulatory system.

Skill Deficiency

Spiro (1978) argues for a two-tiered approach to individual differences in reading comprehension. One tier addresses the component skills of reading comprehension; the other tier is concerned with the manifestation of skill deficiencies in a reading comprehension style. Behavior patterns in the former tier are not considered to have a determinate effect on behavior in the latter tier. At the first tier problems tend to involve skills that are predominantly text-based (e.g., decoding) or knowledge-based (e.g., pragmatic inferencing). Confronted with a skill problem of one of these two types, two options are available to readers: they may persevere in the problem area (with deleterious effects on other processes), or they may escape from the problem by shifting processing resources in an effort to compensate for the problem. Consider readers who are laborious, effortful decoders. They may persevere with their decoding efforts. Given the limitations on information processing capacity, this behavior may produce a "bottleneck" in the system (Perfeti & Lesgold, 1978). The outcome may be that higher-order, more knowledge-based processes will be neglected. On the other hand, readers who are effortful decoders may prefer (not necessarily consciously) to avoid the unpleasant decoding task. One way to do that would be to rely on prior knowledge to infer or guess what is *likely* to be in the text rather than actually reading much of the text. In other words, the same skill deficiency may lead to either one of two totally different comprehension styles (text-biased or knowledge-biased) depending on whether the reader persevered in the problem area or tried to escape from it. (See Spiro, 1978, for discussion of an experiment in which reading comprehension styles were found to be uncorrelated with decoding accuracy or speed).

Misconceptions About Reading

Some children seem to think that knowledge-based processing is not an appropriate activity in reading. They fail to correctly answer questions about text that require extra-textual knowledge. When informally interrogated, they are perfectly able to answer the same questions. If they are asked why they did not utilize the same knowledge to answer correctly after reading, they respond with remarks like "you are not supposed to." They suffer from what might be called a "meaning is in the text" fallacy (it is worth noting that, for some children, this fallacy applies only to their reading for school).

These conjectures about reading misconceptions, which were based on informal observation and interviews, have received empirical confirmation in a study by Spiro and Myers (in preparation). Children who responded to a formal questionnaire about reading concepts with a clear text-based processing bias also tended to answer simple questions requiring extra-textual knowledge incorrectly, despite possessing the requisite knowledge.

What causes misconceptions of reading as a primarily bottom up process? Only speculation is possible at this point. However, likely candidates include code over-emphasis in early reading instruction, reading texts that are insular and lacking in relevance to existing knowledge, and tests that stress literal text content rather than its integration with related prior knowledge.

General Cognitive Styles

For some children who under-utilize prior knowledge in understanding text, the problem may transcend reading. Their reading style may be part of a general tendency to process incoming information in similar fashion, regardless of the type of information and its modality of transmission. Text is an external sitimulus with a structure. Interactive reading requires that relevant internal knowledge structures be superimposed on the text. Those who are overly "text-bound" in reading situations may tend to be "stimulus-bound" in general.

Consider the requirements of an embedded figures test. A memorized geometric shape (an internal structure) must be located within a complex line and shading configuration in the visual field (an external stimulus structure). Empirical studies have shown that those who have difficulty fitting the memorized internal structure onto the external stimulus structure in an embedded figures test also under-utilize internal knowledge structures in reading comprehension (Spiro, 1978; Spiro & Tirre, 1979).

"Bugs" in the Comprehension Program

Finally, there may be some individuals whose overreliance on text-based processes is more apparent than real. That is, because of some idiosyncratic breakdown elsewhere in the system, patterns of reading behavior may elicit a mistaken diagnosis of a given reading style. A case we have identified concerns problems in schema maintenance (Spiro, Brummer, & Boggs, in preparation). Some children appear to be one-sentence-at-a-time readers; they understand individual sentences but fail to integrate information across sentences. One reason is that knowledge structures clearly signaled for activation at one point in the text are not being kept active (or maintained) at later points in the text where they are no longer explicitly evoked (a problem that is not merely one of "forgetting"). Children with this problem fail to engage knowledge-based processes when the requisite knowledge was evoked in previous sentences, but spontaneously perform knowledge-based processes within sentence boundaries. In other words, their top down processing apparatus is intact and is employed; it just frequently does not appear that way because of the schema maintenance problem.

IMPLICATIONS FOR EDUCATORS

Other causes of overreliance on text-based processes could have been suggested, and a similar list constructed for biases towards knowledge-based processing. However, the present discussion need not be extended for some important common-sense implications to be drawn. It seems obvious that one would not want to employ the same remediation strategy for poor readers with differing comprehension styles. For example, inducing a child to relate what is read to prior knowledge might help a child with a text bias but would reinforce the problem of a child with a knowledge bias. It may not be quite so obvious that you may have to treat children differently who have the *same* maladaptive reading comprehension style. Yet, if the same reading comprehension style can be attributed to a multiplicity of causes across individuals (keeping in mind that the extent to which causes co-occur for individuals has not yet been conclusively determined), instruction may have to be determined by the cause and not by its manifestation. What is likely to help a child with a text bias that results from insufficient background knowledge will probably be different from what will help other children with similar text biases that result from a misconception about what reading is or from a decoding problem. There may be a lesson for reading instruction in the dictum "treat the cause, not the symptom."

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CHILDREN'S AND ADULTS' RECALL OF GENERAL CONCEPTS AND DETAILS AFTER READING

Recently, psychologists and educators interested in language comprehension have been studying characteristics of discourse to increase their understanding of the processes involved in language comprehension. One aspect of discourse processing which has received considerable attention from researchers has been the phenomenon of differential recall of segments of a passage. It appears that people, after reading or listening to a passage, recall some ideas of the passage more than others. Not surprisingly, it has been found in a number of studies that people are more likely to recall important ideas than details of passages they have heard or read.

Most of the work in this area has dealt with adults' recall of short expository or narrative passages which they have listened to or read. Meyer (1975) found that adults' recall after reading expository material was related to the hierarchical structure of propositions in the passage. Meyer reduced 500-600 word passages to their constituent propositions and placed the propositions into a hierarchical structure ranging from major concepts to relatively insignificant details. Meyer found that the superordinate propositions were recalled more than the subordinate propositions. Using somewhat different discourse analysis techniques and shorter passages than Meyer, Kintsch, Kozminsky, Streby, McKoon, and Keenan (1975) and Marshall (1976) also found that propositions which were high in the content structure of passages were recalled better by adult subjects than propositions which were low in the content structure of passages. Kintsch et al. (1975) found similar results regardless of whether subjects read or listened to prose.

A number of studies have investigated adults' recall after reading or listening to narrative prose. Johnson (1970) determined the importance of various prose segments through judges who rated the relative importance of pause units in several 300-word folktales. Subjects then read and recalled the folktales. Johnson found that the structural importance of the pause units was significantly related to recall. Subjects' recall was better for important units than less important units.

Working with a story grammar, Thorndyke (1977) segmented several 200-word narrative passages into story components which he then organized into a hierarchical framework. Thorndyke found that adults, after reading or listening to the passages, recalled the high-level organizational story elements better than the lower-level details. Using a similar technique to analyze stories, Rumelhart (1977) found recall patterns which were similar to those reported by Thorndyke in his investigation of adults' recall after reading of several 100-200 word stories.

It appears that adults, whether involved in reading or listening, tend to recall the more important segments of expository or narrative passages which they have processed. It is not clear, however, whether children recall prose in a manner similar to adults because much less work has been done on children's recall of prose than has been done on adults' recall of prose.

Meyer (1977) investigated sixth graders' recall of a 600-word expository

134

passage which was read to them. As with adults, Meyer found that good, average, and poor sixth grade readers recalled more propositions which were high in the content structure of the passage than were low in the content structure of the passage.

Results reported by Tierney, Bridge, and Cera (1978), however, differ from the results reported by Meyer (1977). Tierney et al. (1978) investigated third grade good and poor readers' recall of a 150-word expository passage they had read. Using Johnson's (1970) technique to determine the relative importance of pause units in the passage, Tierney et al. did not find that the third grade good and poor readers' recall was related to the importance of pause units.

Several studies have investigated children's recall of narrative prose. Using Johnson's (1970) technique to rate the importance of pause units, Brown and Smiley (1976) found that third, fifth, and seventh graders recalled the more important pause units better than the less important pause units of several 200-word stories which were read to them. Similar results were reported by Smiley, Oakley, Worthen, Campione, and Brown (1977) in a study on good seventh grade readers' and poor sixth, seventh, and eighth grade readers' recall of narrative prose.

While the evidence is by no means conclusive, it appears that children may recall narrative prose in a manner similar to adults in which the important ideas are recalled better than the less important ideas. The evidence on children's recall of expository material is even less conclusive. It is not at all clear whether children's recall of expository material is related to the hierarchical structure of ideas in the material as appears to be the case with adults.

The purpose of the present study was to investigate children's recall after reading expository material in an attempt to learn more about the cognitive processes used by children in comprehending and remembering expository text. Specifically, children's recall of major concepts and details after reading material on a familiar or unfamiliar topic was investigated.

METHOD

Fifth graders read and orally recalled two expository passages, one on a familiar topic and the other on an unfamiliar topic. Adults also read and orally recalled the two passages so that information on mature readers' recall of major concepts and details for these specific passages would be available when interpreting the data on children's recall of major concepts and details for the passages.

Twenty fifth graders who were randomly selected among fifth graders reading on a fifth or sixth grade reading level from a rural intermediate school in southwestern Virginia and seventeen college students enrolled in a reading-language arts methods course at Virginia Tech served as the subjects for this study.

The stimulus material consisted of two 125-word expository passages which were written by the investigator on a third grade level according to Fry's Readability Graph (Fry, 1968). One passage was on a familiar topic, bird nest building, and the other passage was on an unfamiliar topic, bee dancing. Field testing involving questioning on the two topics was done with other fifth graders from the same school as the subjects to verify that the topics were either familiar or unfamiliar to fifth graders as assumed. An effort was made to keep the passages very similar except for familiarity of subject matter. The two passages contained a similar number of words, a similar number of idea units, a similar number of different concepts, and were very similar in structure. Both passages followed the same pattern of major concepts and details. A discourse analysis technique based on the work of Grimes (1975) and Meyer (1975) was used to reduce the passages to propositions and to place the propositions into a hierarchical structure of major concepts and details. Every predicate or argument of a proposition was considered to be a separate idea unit. The passage on bird nest building contained 60 idea units, 20 of which represented major concepts and 40 of which represented details according to the hierarchical content structure of the passage. The passage on bee dancing contained 61 idea units, 24 of which represented major concepts and 37 of which represented details.

Each child worked independently with the investigator for about 15 minutes. First, the child read and orally recalled a practice passage on underground animal homes. Then the child read and orally recalled the two test passages which were presented in random order among subjects. All recalls were free recalls; subjects were not probed with questions. The adults worked independently on the task. They were told to read each passage once and to orally recall as much as possible without looking back at the material. As with the children, passages were read by the adults in random order. All of the children's and adults' recall were taped. The recalls were transcribed and scored by the investigator for number of idea units recalled. A second person, who was trained in the discourse analysis procedure which was used to analyze the passages and to score recalls, scored a random sample of eight recalls to establish interrater reliability. The investigator and scorer had 95% agreement on whether an idea unit had or had not been recalled. The Pearson product moment correlation for the scores assigned to the eight passages by the investigator and scorer was $r = .97$ for total scores, $r = .98$ for main idea scores, and $r = .95$ for detail scores.

RESULTS

The mean scores and standard deviations for major concept, detail, and total idea units recalled by the fifth graders and adults on the two passages are presented in Table 1. The fifth graders recalled one half the number of idea units that the adults recalled on both passages. Correlated data t-tests were used to determine whether the two groups recalled more on the familiar passage than on the unfamiliar passage. Both the children and adults recalled more idea units on the familiar passage than the unfamiliar passage ($t(19) = 2.20$, $p < .05$; $t(16) = 2.20$, $p < .05$). In the familiar passage, the ratio of general concept units to detail units was .5 and in the unfamiliar passage the ratio was .65. Correlated data *t*-tests were used to determine whether the two groups' recall of major concept units reflected the same ratio of major to detail units that were present in the original passages. For the adults the ratio of major concept units to detail units recalled on the familiar passage did not differ from .5 ($t(16) = .36$, $p > .05$), and the ratio for the unfamiliar passage did not differ from .65 ($t(16) = .45$, $p > .05$). The fifth graders' recall of major concept units on the familiar passage reflected a ratio significantly less than .5 ($t(19) = 2.25$, $p < .05$). However, their recall ratio on the unfamiliar passage did not differ from .65 ($t(19) = .27$, $p > .05$).

TABLE I

Retelling Scores for Major Concept, Detail, and Total Idea Units Recalled by Fifth Graders and Adults

			Fifth Graders (N = 20)	Adults (N = 17)
Familiar Passage	Main	M	6.00	15.41
		SD	4.65	3.73
	Detail	M	16.85	30.18
		SD	6.16	5.94
	Total	M	22.85	45.59
		SD	8.67	8.16
Unfamiliar Passage	Main	M	7.35	15.41
		SD	3.27	4.99
	Detail	M	11.70	24.47
		SD	6.63	6.27
	Total	M	19.05	39.88
		SD	8.46	9.79

DISCUSSION

The results of this study do not suggest that adults or children are more likely to recall general concepts than details after reading short expository passages. The discrepancy between this study and other studies on adults' recall of expository material which found that adults tend to recall general concepts more than details is perhaps due to the nature of the passages used in this study. These passages were atypical passages for adults to read because they were very easy and short, and the adults were able to recall 75% of the idea units in the familiar passage and 65% of the idea units in the unfamiliar passage which is unusually high recall.

The passages used in this study were more appropriate as reading material for fifth graders than for adults because the passages were written on a third grade level. It appears that the fifth graders were not primarily recalling major concepts after reading familiar or unfamiliar material. In fact, on the familiar passage it appears that the fifth graders were recalling primarily details. This suggests that the fifth graders were focusing their attention mainly on details instead of major concepts when reading the relatively easy familiar material. Reading for details may be a skill which children develop in school and use in certain situations, as when dealing with expository material which is not too difficult to read. On the unfamiliar passage the fifth graders did not primarily recall details as they did on the familiar passage but recalled major concept units and detail units in the proportion that these units occurred in the passage. Because the material was unfamiliar, the children may not have been able to focus their attention on meaning while reading the unfamiliar passage, and therefore recalled major concepts and details in a random manner.

The finding that both the children and adults recalled less after the familiar passage supports the theoretical notion that prior knowledge, or schema, is an important factor in reading comprehension (Adams and Collins, in press; Frederiksen, in press; Kintsch and van Dijk, in press; Smith, 1978). Prior knowledge is used by a reader to process text, to interpret the text in terms of what the reader already knows, and to recall the text. Presumably, the fifth graders and adults recalled more about reading the passage on bird nest building than after reading the passage on bee dancing because they had more prior knowledge about bird nest building than about bee dancing which was put to use in the comprehension and recall processes.

In summary, the results of this study suggest that children do not necessarily comprehend and remember text in the same manner as adults. The notion supported by a number of studies that people tend to recall major concepts instead of details after processing text may not be true for children reading expository material. Children's recall of major concepts and details after reading non-narrative text is a topic which warrants further investigation because of its educational relevance. New information leading to a better understanding of children's processing of major concepts and details while reading will undoubtedly be valuable to reading teachers and to teachers in the content areas.

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139

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THE FUNCTIONS OF INFERENCES: AN EXTENDED EXAMINATION OF DISCOURSE COMPREHENSION

Examinations of readers' discourse comprehension suggest that readers selectively process text using information from the text and their knowledge of the world to construct a representation based upon the interaction of the two. For example, when a reader's recall is compared to the original text, it will contain some information which was explicitly stated in the text and some information which was not explicitly stated, but which can be related to reader-text interactions.

An important implication of these observations is that a reader's omission, substitution or insertion of ideas are not a sign of random reader errors, but rather a signal of reader-text interactions. That is to say, they reflect the reader's constructive processing toward the integration of their own experience with the text. An important implicit assumption is the notion that by analyzing a text and comparing a subject's memory for a text to the structure of the text itself, some specificity relative to the nature of the reader's discourse processing operations are derived. Further, by examining the reader's omissions, insertions, and substitutions, that is to say, their abstraction and inference, some specificity relative to the reader-text interactions which guide this processing will be suggested.

Along this line of reasoning, the present study was concerned with an ad-hoc analysis of the discourse processing operations of selected children for a narrative. In previous examinations, the nature of the discourse processing operations of these readers had been described; it was the purpose of the present paper to extend these examinations to a functional analysis of the reader's text-based inferences and abstractions. In other words, the present examination was intended to help explain the processes which guided a reader's comprehension. As Frederiksen (1977b) suggested that a theory of inference in reading comprehension must not only "specify the types of inferential operations which occur and the discourse context in which they occur, but it must also account for the processes which control inference." It must "account for the interplay of text-based information and schema-based information in the control of discourse processing."

Background to the proposed examination

The nature and amount of information rendered by eighteen third graders during recall had been examined and compared (Bridge, Tierney & Cera, 1979). This had entailed a comparison of each reader's recall with the content and structure of the narrative selection. The content and structure of the selection had been defined in terms of its propositional content and interpropositional structure, using Frederiksen's system of text analysis (Frederiksen, 1975). Likewise, the content and structure of each retelling had been defined in terms of its propositional content and interpropositional structure. Using the propositional content and interpropositional structure as a scoring key, the amount of explicit or reproduced information, and the amount of inferred information was determined for each reader's recall. Readers were identified as good and poor readers by teacher judgement and standardized test results. Based upon a comparison across the recalls of these readers for a narrative selection, the following findings were suggested:

1. All readers selectively processed explicit text-based information, with readers remembering or choosing to retell sometimes less than half of the possible concepts and relations in the passage.
2. Readers, individually and as a group, rendered differential amounts of explicit and inferred information across recall situations.
3. Nearly half of the information in the retellings of all readers was inferred.
4. Good readers differed from poor readers in the extent to which they addressed casual, conditional, and ordinal relationships.
5. Good readers matched the major events within the episodic structure of the selection; poor readers failed to address the dual protagonist situation presented in the narrative.

Framework for examining functions of inference

Toward a functional analysis of the readers' inferences, Frederiksen's Taxonomy of Text-Based Inferences (Frederiksen, in press; Frederiksen, 1977a) was combined with aspects of both Frederiksen's Types of Functional Contexts of Inference (Frederiksen, in press; Frederiksen, 1977a; Frederiksen, 1978) and van Dijk's suggestions for macro-rules (van Dijk, 1977).

Frederiksen's Taxonomy of Text-Based Inferences

Within this framework, the readers' inferences were isolated according to Frederiksen's Text-Based Inference categories and totalled. From these data, it was evident that both good and poor readers engaged a wide variety of inference types and that both good and poor readers engaged the same types of inferences. In terms of the total number of inferences within each inference class, there was only minimal differences between good and poor readers. Using a chi-square statistic, there was no statistically significant difference between good and poor readers across inference classes ($X^2(6)=3.525, p > .05$). The classes of inference included lexical, identification, frame, event, macrostructure, algebraic and dependency.

Functions of inference and macro-rules

To provide further clarification of the processes which guided the readers' discourse comprehension, each reader's retellings were re-examined in terms of an additional five categories of inference. Two of the categories —extension and connection — were based upon Frederiksen's Functional Contexts of Inference (Frederiksen, 1977a; Frederiksen, 1978). Three of the categories — generalization, deletion, and integration — were based upon van Dijk's suggestions for macro-rules involved in discourse comprehension (van Dijk, 1977). The five categories were seen as defining how readers constrained the text and used their background knowledge toward discourse comprehension.

Connection was defined as the extent to which disconnected propositions within the original text were connected. For analysis purposes this entailed determining the number of interpropositional connections generated for previously disconnected propositions. Extension was defined as the generation of proposition which extended the meaning given by the original set of propositions. For analysis purposes this entailed determining the number of new propositions which were connected to propositions within the original text. Generalization was defined as the replacement of a set of propositions with a superordinate proposition. For analysis purposes this entailed examining the text and retellings to isolate those propositions which appeared to subsume other propositions within the text. No judgement was made with respect to either the relevancy of this superordination or the level of generality of the superordinate proposition. Deletion was defined as the readers' ommission of text-based information. For analysis purposes this entailed defining the number of propositions within the readers' retelling which were deleted from the original text. It did not entail judging the relevancy of these deletions. Integration involved the replacement or substitution of episodes or propositions with a statement that served an integrative, topical or thematic role. For analysis purposes it included those propositions which substituted for series of other propositions. For example, a reader might refer to a series of propositions with the macro-proposition which, under normal conditions, denotes the series of propositions.

Obviously, analyses based upon these categories have limitations. For example, it might be argued that retellings are only a manifestation of discourse processing and, therefore, the present data misrepresent the inferences readers made. Furthermore, as suggested previously, the categories of inferences failed to address: 1) the relevance of the reader's connections, extensions, generalizations, and constructions; and 2) those connections and extensions either implicitly related or tied by referrents, e.g. anaphora.

Nonetheless, within the framework of these limitations, the data afforded some worthwhile insights. Specifically, it was apparent that all readers engaged various amounts of each of the five categories during discourse comprehension. (These data are presented in Table 1). Furthermore, from a comparison of good and poor readers in terms of these five categories, there were no significant differences in the frequency with which readers engaged connection ($t(16) = .41, p > .05$), extension ($t(16) = .46, p > .05$), and generalization ($t(16) = .76, p > .05$). However, there was a significant difference in the amount of integration and deletion engaged by good and poor readers. More specifically, good readers engaged significantly more subsuming proposetions which were integrative ($t(16) = 3.05, p < .01$); poor readers deleted significantly more propositions from the original textbased ($t(16) = 2.6, p < .05$).

An examination of the nature of integration clarifies the important contribution this macro-rule makes to discourse processing. As van Dijk (1977) pointed out this macro-rule "allows us to describe detailed actions and events at a more global level, where typical co-occuring subevents need not be mentioned." As he suggested integrative propositions "not only organize and reduce information, but may also serve as retrieval cues."

In summary, then, the data derived from these extended analyses of retellings affords a more functional examination of inferencing during discourse comprehension. From a schema perspective, they afford some insights into the nature of a reader's understanding. In particular, the data provide some definition of nature of a reader's constraining operations during discourse comprehension (Collins, Brown and Larkin, 1977). The data

TABLE 1

Number of Inferences by Function and Macro-rule.

Subject	Connection	Extension	Generalization	Deletion	Integration
1	0	3	0	16	3
2	0	4	1	12	3
3	2	2	0	18	4
4	2	0	1	24	3
5	2	1	1	19	3
6	1	1	1	14	4
7	1	2	0	18	3
8	4	0	0	13	2
9	3	4	0	14	5
10	3	2	0	17	3
11	0	2	2	24	2
12	1	1	1	18	2
13	1	0	0	22	3
14	1	1	0	24	3
15	2	2	1	20	2
16	1	0	1	18	2
17	2	5	1	20	1
18	2	1	0	20	2
Total Good Readers (1-9)	15	17	4	148	30
Total Poor Readers (10-18)	13	14	6	183	20

suggest that the ability to integrate propositions is essentially what differentiates "control" of inference processes by good and poor readers. Beyond the present study, the data suggest the need for further research on a reader's use of macro-operators along with examinations of the rules which govern their use. This implies extending analyses of reading comprehension to studying the contracts which exist among author, text, and reader. That is, beyond defining the influence of text and reader characteristics, researchers should explore the contractual agreements which exist among author, text, and reader. For example, in accordance with Halliday's concept of register (Halliday, 1974) and toward a speech act theory of discourse comprehension Pratt, 1978), researchers might explore the existence of similar implicit allowability contracts which restrain the macro-operations of authors during discourse production and the macro-operators of readers during discourse comprehension.

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TRUTH MEANING VERSUS REFERENTIAL MEANING IN ADULTS' READING COMPREHENSION

A significant yet little understood question is: What is meaning? This question is important not only to the disciplines of linguistics and psychology but underlies the basic enterprise of reading research. How one interprets the notion of reading comprehension presupposes that one has adopted a particular interpretation of meaning.

To the present, reading researchers have construed meaning in a manner similar to linguists and psychologists (cf. Brewer, 1973; Olson, 1977). Linguists have been concerned with either the interpretive (Katz & Fodor, 1963; Katz & Postal, 1964) or generative (Lakoff, 1976; McCawley, 1973) interpretations of meaning. In short, these approaches are concerned with determining whether meaning as reference is determined by syntactic structures (i.e. the interpretive approach) or else dictates syntactic structures (i.e. the generative approach). In either case, meaning is viewed as how dictionary interpretations of morphemes, words and/or sentences are either mapped onto grammatical structures or determine grammatical structures themselves. Whether syntax either dictates meaning or meaning generates syntax, meaning in both cases is construed as literal, or referential.

Psychologists have similarly adopted the view that meaning is referential (cf. Brewer, 1974). Although psychologists themselves disagree as to whether meaning is interpretive (Bransford, Barclay & Franks, 1972) or generative (Bransford & Johnson, 1973), proponents of either position have tended to construe meaning in terms of the semantic features directly stated or inferred (e.g. Thorndyke, 1976) which underlie the basic representation of a sentence (Carpenter & Just, 1975), a paragraph (Frederiksen, 1975), or a story (Stein & Glenn, 1978).

The question of whether meaning is interpretive or generative underlies the present debate in reading research as to whether reading is a 'bottom-up' or a 'top-down' process. In the former case, meaning depends on how one decodes and recognizes the structure of text (e.g. Carroll & Chall, 1975; Gibson & Levin, 1975). This is similar to the interpretive position. The 'top-down' approach is similar to the generative position that meaning already exists in the mind; that the reader uses this meaning either to reduce uncertainty in the written text (Smith, 1971) or to construct hypotheses as to the plausible meaning of the written text (Goodman, 1967). But, again, whether reading is viewed as 'bottom-up' or 'top-down', the meaning assumed common to both these approaches is referential meaning, be it directly stated or implicitly inferred.

Although referential meaning is certainly a significant aspect of comprehension, this type of meaning in no way defines the universe of meaning types (cf. Brewer, 1973). A type of meaning which has received little attention in research on reading comprehension is meaning as "truth" — in other words, meaning of linguistic statements as they reflect some *de facto* condition of reality itself. On the one hand, it is something to be able to paraphrase a sentence, paragraph or story, identifying facts and selecting the 'most appropriate title'. This is referential meaning. On the other hand, it is something quite different to be able to say whether a sentence, paragraph or story represents a valid description of some reality. It is something to make a logical inference, deducing a new referential linguistic statement based on given linguistic statements. On the other hand, it is something quite different to make a pragmatic inference, deducing a new referential linguistic statement based on given knowledge about how reality is structured (cf. Ackerman, 1978).

In short, what is needed in research on comprehension is a consideration of the question of how children and adults understand text not only in terms of its literal or logical meaning but also in terms of its truthfulness relative to reality. One approach to this question is to consider how people understand verifiably different statement types and how people actually interpret these statements in terms of some type of verification procedure (cf. Wilson, 1969).

Meaning as verifying different statement types

Underlying meaning as "truth" is the assumption that different statement types require different means for verifying them. In this regard, Wilson (1969) has noted that there are three basic kinds of statements, differentiated primarily on the basis of how they are verified (i.e. judged meaningful or "true"). These are: Empirical, Analytical and Value. Empirical statements make comments about the real world, and are verified in terms of our world experience. Thus sentence (1)

(1) Mary went shopping for some cheese.

refers to a real-world situation, which may be verified by observation; in this case, for example, seeing Mary leave the house with a shopping list.

Analytical statements, on the other hand, do not refer to conditions about reality directly; rather they describe and define logical and linguistic relationships. For example, statement (2)

(2) Nine plus two equals eleven.

does not refer to a real-world situation. Rather, its verification is appropriately made by reference to logical or linguistic rules. Such statements are true if one places or restates a lexical item with one or more semantic features that logically comprise its referential meaning. Such statements are appropriately verified if one follows the 'correct' rules for replacing one term with one or more of its semantic equivalents. 'Correctness' is defined either by reference to the authority of a dictionary or some logical system such as mathematics. The sentence given in (2) for example is "true" because in the Arabic number system, we have set up an arbitrary but internally consistent system of addition; therefore by necessity of mathematical logic, nine plus two equals eleven. In addition, our language system arbitrarily but consistently represents numbers with language (9='nine', etc.).

Finally, Value statements make attitudinal judgements about objects, people or events in reality. For example, statement (3)

(3) Sheep are stupid animals.

is a writer's judgement about the stupidity of sheep. To judge such a statement as meaningful or "true", one has to establish definitions (or criteria) for the attitudinal term 'stupid', and then judge the entire statement relative to this particular definition. Despite appearances, sheep are not stupid by definition; thus sentence (3) will have to be verified by defining 'stupid' in terms of actions that are counter to the well-being of the animal (e.g. standing out in the rain instead of taking shelter, thereby catching fever), and then observing that sheep do in fact do these things. Value statements will always be harder than Empirical or Analytical statements for people to agree on what constitutes their "truth-value", since they depend so much on the particular person's definition of the attitudinal term involved.

Although Wilson (1969) has identified these three primary statement types, and suggests that they are differentiated primarily by the verification strategy, there is little empirical evidence to demonstrate that such statements are indeed verified in the manner that Wilson describes. If people, in fact, are sensitive to the different verification procedures required by the different statement types, one may conclude that they do possess a general consciousness of meaning as "truth" as they read. On the other hand, if people are insensitive to the different verification procedures, one may conclude that they tend not to recognize that linguistic "truth" as a description of reality is relative to the statement type used to describe a given condition of reality.

The purpose of the following experiment was thus to determine whether Wilson's (1969) statement types indeed are recognized as entailing different verification procedures; also, to determine whether adults use appropriate critical reading skills for assessing the most propitious way of judging a statement as "true" relative to the most appropriate verification procedure.

METHOD

Subjects.

Subjects were 27 students enrolled in a graduate course in the School of Education at the State University of New York at Albany.

Materials.

Nine statements were prepared, comprising three examples of empirical, analytical and value statement types, as defined by Wilson (1969). Statements were typed in random order.

Procedures.

Subjects were told that the study was investigating how people determine the "truth-value" of a statement, and were asked to give (a) what they considered to be the most sensible and appropriate way of proving the statement to be true, and (b) under what conditions would they want to devise other ways of proving the statement to be true. Subjects were given 45 minutes to complete the task.

Scoring.

Verification strategies for each statement were scored as empirical, analytical or value. An empirical verification sought to prove the given statement true by reference to the observable:

Given Statement	Response scored "Empirical"
John was playing (empirical)	Ask him what he's doing.
Things never fall upwards (analytical)	Drop an apple.
Cornflakes are good for you (value)	Taste them.

An analytical verification sought to prove the given statement true by reference to logical or linguistic rules:

Given Statement	Response scored "Analytical"
John was playing (empirical)	If John was engaged in a game of some kind, then he was playing.
Things never fall upwards (analytical)	Law of gravity. The term 'fall' indicates downward motion.
Cornflakes are good for you. (value)	They are good for you because they are good for you.

(Note: Value statements can only be analytically verified by restating the statement (e.g. A=A).

A value verification sought to prove the given statement true by reference to a definition of attitudinal terms:

Given Statement	Response scored "value"
John was playing (empirical)	Because he was having fun.
Things never fall upwards (analytical)	Because that's the way things are.
Cornflakes are good for you (value)	Depends on what you mean by good. If it's nutritional value, then cornflakes are good for you because they have much protein, etc.

RESULTS

The purpose of this experiment was to determine how given empirical, analytical and value statements are verified by adults, under 2 conditions: (a) when asked to give the most sensible and appropriate method of verification; and (b) when asked to give the method of verification under conditions other than (a). From Table 1, when subjects are asked to give the most sensible and

TABLE 1

Percentages of empirical, analytical and value verification strategies in response to given statements (N=27)

		GIVEN STATEMENTS		
VERIFICATION STRATEGY		Empirical	Analytical	Value
Empirical	(a)	91.4%	50.6%	23.5%
	(b)	85.2%	34.6%	24.7%
Analytical	(a)	1.2%	46.9%	0.0%
	(b)	1.2%	48.1%	0.0%
Value	(a)	7.4%	1.2%	75.3%
	(b)	2.5%	2.5%	64.2%
No response	(a)	0.0%	1.2%	1.2%
	(b)	11.1%	14.8%	11.1%

(a) Condition 1: "Give the most sensible and appropriate way of proving the statement to be true."

(b) Condition 2: "Give other conditions under which the statement may be proved to be true."

appropriate method of verification, they appear to treat the three statement types somewhat differently. Empirical statements are most often verified empirically (91.4%) or analytically (1.2%). Value statements are most often verified evaluatively (75.3%), but a substantial percenta (23.5%) are verified empirically. None were verified analytically. Analytical statements, on the other hand, were slightly more often verified empirically (50.6%) than analytically (46.9%) in this condition: few analytical statements were verified evaluatively (1.2%).

When asked to give the method of verification under different conditions than (a) above, subjects gave similar responses for empirical and value statements, except that the number of 'no responses' was significantly higher. Also, in this condition, analytical statements were more frequently verified analytically than empirically (48.1% vs 34.6%). Again, the number of 'no responses' was significantly higher (14.8% vs 1.2%).

DISCUSSION

This study demonstrated the following: (1) that Wilson's (1969) statement types are indeed verified differently in the manner suggested by him, and (2) that adults appear to be sensitive to the "truth" meaning as well as the "referential" meaning of what they read. If subjects were not sensitive to the "truth" meaning, one would predict that they would verify the different statement types in a haphazard manner, i.e. adopt no consistent pattern of verification stategies. However, in this study, such was not the case. In fact, there appears to be a consistent hierarchy of verification strategies. The first of these may be termed *congruent*, where subjects verified a given statement type according to Wilson's verification scheme. This was most potent in the case of empirical statements, next most potent for value statements, and least potent for analytical statements. The second strategy may be termed *'most-preferred'*, whereby a given analytical or value statement was verified using empirical criteria. The least favored strategy was to verify empirical and value statements using analytical criteria, or to verify analytical statements using evaluative criteria.

The above hierarchy operated under the first instructions, "Give a sensible and appropriate way of proving the statement to be true"; however, a shift in the strategy hierarchy is noted under the second instruction, "Under what conditions would other ways of proving the statement true be appropriate?" In this instance, the congruent strategy is approximately the same for empirical and value statements, but considerably more potent for analytical statements. In other words, only when cued to give alternative meanings for proving a statement to be true did subjects become more inclined to verify analytical statements using appropriate replacement rules.

These findings raise several significant questions for reading researchers. Although this study has investigated how adults map 'truth' meaning onto different verification structures (i.e. sensory experience, attitudes, replacement rules), it leaves open the question of the relationship between "truth" and "referential" meaning. How "referential" meaning is mapped onto "truth" meaning or vice versa is far from clear at this time.

Secondly, in terms of teaching and evaluating reading, the study raises the question of how children come to understand printed text as "truth" meaning.

At present, instruction and/or evaluation of "truth" meaning is extremely rare: moreover, models of reading themselves presuppose referential meaning, and tend to overlook "truth" meaning. Yet if one is to go beyond the literal *understanding of text, children need to understand "truth" meaning in order* to comprehend text as a representation of reality.

Finally, we question reading researchers' preoccupation with the question of whether meaning is 'interpretive' or 'generative', rather than with the question of what is the purpose of reading in general. Researchers, teachers and evaluators have typically assumed that the purpose of reading is to understand the text itself (cf. Olson, 1977). This study suggests that an equally significant purpose of reading is to understand the reality which the text itself purports to represent. As this study has shown, adults are indeed sensitive to "truth" meaning and do adopt consistent strategies for making sense of text as a description of reality.

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SOME DIFFERENCES BETWEEN GOOD AND POOR READERS

An increasingly popular view in the literature on reading is that comprehension failures are often but reflections of difficulties with some process that is more deeply embedded in the system — difficulties that are blocking the normal flow of information or usurping attention away from the task of understanding. With this shift in perspective, there is increasing evidence that the problem is very frequently located at the level of word recognition (Lesgold & Perfetti, 1978). The goal of the present experiment was to identify components of the word recognition process that require different amounts of active attention from good and poor readers and might therefore underlie differences in comprehension.

The work to be described pivots on the word superiority effect, or the phenomenon that skilled readers seem able to perceive words, and to a lesser extent word-like strings of letters (pseudowords), more quickly and accurately than could be expected on the basis of their ability to perceive individual letters. Recent data makes certain that the effect cannot be wholly attributed to sophisticated guessing, and this is important (Adams, 1979; Johnston, 1978). Sophisticated guessing involves an active decision-making process which operates on a very complex set of information which itself must be actively entertained. That is, sophisticated guessing may save the reader from thorough visual encoding of a word, but it is a lot of work in its own right. That the word superiority effect cannot be adequately explained by sophisticated guessing means that the advantage of words for good readers is in part automatic; it is due in part to processes that are built into the perceptual system. It is these processes that should be the primary suspects for deficits among poor readers.

Through a series of experiments with skilled readers, we have been able to focus on the nature of these processes. The model of word recognition processes derived through these experiments was used as the starting point in our examination of poor readers (see Adams, 1979). The model posits four, more or less separable, skills that are integral to the word recognition process for skilled readers. These are: (1) letter recognition; (2) extraction of order information; (3) sensitivity to the sequential redundancy of English orthography — that is, to interletter transition probabilities; and (4) sensitivity to whole words. In the present study, good and poor readers were asked to identify words, pseudowords, and nonwords across a range of exposure durations in order to determine which, if any, of these abilities tended to be underdeveloped among poor readers.

All subjects participated in both a Mixed Condition, in which words, pseudowords, and nonwords were interspersed with each other, and a condition in which only nonwords were presented. From experience, we expected the good readers to perform better in general. However, the magnitude of the good readers' advantage was expected to interact with conditions. Specifically, it was expected that performance in the Nonword Condition would be based simply on the perception of the letters and their order. By contrast, the presence of words and pseudowords was expected to arouse readers' words and bigram processors as well (Aderman & Smith, 1971), resulting in a tendency for them to reorganize the nonwords in the Mixed Condition. Since the good readers were supposed to have better developed word and bigram recognizers, they should be especially biased toward such reorganization. To summarize our predictions, then, we expected the good readers to perform better by every measure than the poor readers. We expected the nonwords to be better reported in the Unmixed than in the Mixed Condition, and we expected that to be especially true for the good readers.

METHOD

Subjects

The subjects were 16 high school students paid for participation in the study. They were selected and categorized as good or poor readers on the basis of their scores on the *Nelson-Denny Reading Test*. The mean percentile reading scores for the good and poor readers, respectively, were 95.6 and 47.0.

Materials & Apparatus

The stimuli consisted of four-letter words, pseudowords, and nonwords. The words were selected from among the highest frequency four-letter types in the Carroll, Davies, and Richman (1971) general norms; their mean frequency was 500 per million. The pseudowords were constructed so as to maximize their positional bigram frequencies according to Mayzner and Tresselt's (1965) norm for four-letter words; in addition, all of the pseudowords were obviously pronounceable, and none were homophonic with real English words. The nonwords were generated so as to minimize their positional bigram frequencies, and none of them were obviously pronounceable. None of the stimuli contained repeated letters. All of the stimulus sets were matched in terms of simple letter frequency.

The experiment was implemented via an IMLAC PDS-1 scope controlled by a TENEX computer system. The stimuli were displayed in lower case fonts; the mask was composed of scattered fragments of the fonts.

Procedure

The computer initiated each trial by demarcating the fixation field. When the subject was ready, she/he depressed a footpedal which resulted in: (1) an additional 500 msec display of the fixation field; (2) a 5 msec presentation of the stimulus; (3) a blank retrieval of variable duration; and (4) a 50 msec presentation of the mask. The effective exposure duration of the stimulus under this procedure corresponds to the interval between the onset of the stimulus and the onset of the mask. In this experiment the values of the effective exposure duration were 5, 10, 15, 20, 25, 30, 35, 40, 50 and 200 msec. The 200 msec interval was included to reveal any significant differences between reading groups in stimulus retention as opposed to encoding (there were none).

In the Mixed Condition, subjects saw 8 words, 8 pseudowords and 8 nonwords at each of the 10 effective exposure durations; in the Nonword Condition, they saw 8 nonwords at each of the 10 durations. Both the exposure durations and the stimuli were randomized so that on any given trial

152

subjects had no way of knowing how long the stimulus would be present or, in the Mixed Condition, what kind of stimulus would be present. No subject saw any stimulus twice. The subjects' task was to report all four letters of each stimulus, in order, guessing if necessary.

RESULTS AND DISCUSSION

In order to evaluate our predictions, the accuracy functions for each subject were first fitted against the logistic function:

$$P_c(t) = \frac{\exp\ (1.7\ a(t\text{-}b)\ )}{(1+\exp\ (1.7\ a(t\text{-}b))},$$

where $P_c(t)$ corresponds to the probability of a letter's being correctly reported at an effective exposure duration of t. Under this equation the correlations between predicted and observed performance were above .90 for every subject.

The utility of this equation is that the two parameters summarize important aspects of the performance function. The parameter *b* is an index of overall perceptibility; it corresponds to the stimulus duration required to report 50% of the letters correctly. The parameter *a* gives the rate or efficiency with which information is encoded. Two analyses of variance were carried out on values for each of these parameters: the first was based on the probabilities of correctly reporting letters regardless of the order of report, and the second, on the probabilities of reporting letters on their correct position within a quadrigram. For each analysis the factors included were reading ability level, subjects within reading level, and the four item types.

Under both scoring rules, the perceptibility parameter, *b*, was found to vary significantly across stimulus classes ($p < .01$). However, under neither analysis was *b* found to be significantly associated with reading ability level; this is consistent with previous findings that differences in reading ability are not generally related to differences in sensory processing capabilities (Jackson & McClelland, 1975).

In contrast, both analyses of the *a* parameter revealed significant differences between the two groups ($p < .01$), corroborating our initial hypothesis that the performance of the good readers would be better in general than that of the poorer readers. The value of *a* also differed significantly across item types, ($p < .01$) as readers generally encoded the high frequency words most efficiently and the nonwords least efficiently. In addition, a significant interaction between reading ability and item type ($p < .05$) bore out our second prediction: the performance of good readers on nonwords was substantially more efficient when the nonwords were presented alone than when they were intermixed with words and pseudowords; for the poorer readers there was virtually no difference. Just as expected, the good readers' ability to identify nonwords in the mixed condition was suffering interference in a way that the poor readers' was not.

To identify the source of these differences between the groups of readers, we turned directly to the accuracy functions. Comparisons of the two groups in the Nonwords Alone condition revealed that, wherever performance was above chance, the good readers demonstrated consistently higher probabilities both of correctly identifying the letters of the stimuli and of reporting any

153

correctly identified letters in their correct positions ($p < .01$). Inasmuch as performance in this condition required no higher order processes, these data indicate that there are very basic differences in the readers' abilities to recognize individual letters and to encode their order.

In the Mixed Condition, a similar pattern of results emerged for the nonwords and pseudowords. For both of these types of stimuli the good readers held a consistent advantage over the poor readers in terms of both the number of correctly identified letters and the conditional probability of reporting any correctly identified letters in their correct positions ($p < .01$). However, there was virtually *no difference* by either measure between the performance of the good and poor readers on the words. The implication is that the poor readers are at least as sensitive as the good readers to whole, high frequency words. In fact, it seems that the poor readers are so highly attuned to high frequency words that it completely compensates for the weakness in single letter recognition and order extraction that they demonstrated in the Nonwords Alone condition. Still, the poor readers must be lacking in something else or they would have displayed more interference with the nonwords in the Mixed Condition. The alternative offered by the model is that the poor readers may be lacking in their sensitivity to bigram probabilities.

To corroborate this conclusion, John Frederiksen and I have, in another experiment, explicitly tested good and poor readers' sensitivity to bigrams of different frequencies and in different positions in a string. We have found that for poor readers, the perceptibility of a bigram depends very strongly on its frequency. Their performance was moderately depressed with very high frequency bigrams, and fell off very steeply as bigram frequency decreased. Moreover, even with frequent bigrams, poor readers experienced little facilitation unless the pair of letters occurred in the first two positions of a string (see Frederiksen, 1978).

To summarize, these data indicate that poor readers as a group are not less sensitive than good readers to high frequency words. However, poor readers do not exhibit the same facility as good readers either in recognizing individual letters or in encoding their order. In addition, poor readers do not accrue the same advantage as good readers from regular orthographic structure.

The implication is that for poor readers, the coherence of the reading task will depend critically on their recognizing the words as wholes. Word recognition should cause no problems as long as the words to be recognized are very familiar. However, poor readers will be handicapped whenever they encounter less familiar words. When the memory representation for the whole word is not immediately available, they have relatively little to fall back on. They will have to do more work to recognize the letters and to encode their order than a good reader would have to. And, because of their relative insensitivity to orthographic regularity, the information they do extract will not be met with the same automatic support and amplification as it would for a good reader. From this perspective, it is understandable that poor readers might have less capacity and even patience left over for the task of comprehending what they have read.

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CLINICAL READING PRACTICES: SOME LEGAL CONSIDERATIONS

The passage of *The Education for All Handicapped Children Act* (PL 94-142) by the United States Congress in 1973 places the education of children in a unique legal situation. This act establishes strict legal procedures and guidelines regarding the education of any "exceptional" child. While a cursory examination of this piece of legislation reveals great implications to the "special education" area, it might not expose subtleties in the act which affect other areas as well.

The entire area of reading becomes implicated with this act because reading involves the use of "written" language.

Since reading education programs and reading clinics are affected by PL 94-142, the matter of compliance becomes important. There are a great number of reading clinics who are unaware of the implications of PL 94-142 on their clinical procedures. Also, many reading education programs use reading clinical facilities to train and educate their students. This entanglement between reading program and reading clinic may violate certain sections of PL 94-142 as well as the Buckley Amendment.

The history of judicial intervention in public schools can be traced back to the 1954 landmark desegregation decision of *Brown v. Board of Education* This decision affirms equal educational opportunity. Since this major decision, the courts are continuing to evaluate educational practices. The following are some highlights of areas of judicial intervention in education.

In 1972, the Pennsylvania Association of Retarded Citizens (PARC) initiated a class action suit on behalf of all retarded persons between six and 21 which were excluded from public education. This decision resulted in the State's obligation to provide free public education and training appropriate to the child's capability.

In addition to the court's interest in appropriate educational programs, they are also scrutinizing the use of test scores for placing pupils into these various programs. In 1968, *Hobson v. Hansen,* the court rules that placing children into various ability tracks on the basis of achievement test scores is unconstitutional.

In California the use of intelligence tests with black children was questioned. In *Spangler v. Board of Education,* the courts rules that intelligence tests should not be administered because of their "questionable validity."

As is evident from this brief review of litigation in education, the courts are continually becoming more interested in different procedures used in education, especially fields such as special education. Two areas in which the courts have shown particular interest are: 1) practices which involve testing and placement of children into special classes, and 2) procedures which fail to protect the privacy of children.

The purpose of this study is to determine whether current clinical reading practices are violating the rights of children.

METHODS

Materials and Procedures

A random sample of 145 reading clinics was chosen from a master list of 176 clinics listed in the IRA's publication *Graduate Programs and Faculty in Reading* by John Guthrie (1976). A 63 item questionnaire was mailed to the head or director of all the reading clinics in the sample (in the United States and Canada). The questionnaire consisted of both objective and subjective questions focusing primarily on the specific procedures used in clinical reading evaluations.

RESULTS

The Referral Process

There are two primary ways in which a child who has a reading and/or learning difficulty is generally recommended to a reading clinic. Usually parents, alarmed at their child's gradual educational decline (especially in reading), refer their child to the school or to a reading clinic. The other way for a child to be referred to a reading center is for the school to make such a recommendation. Usually the parents are notified, sometimes they are not. The data from this study indicates that the public schools refer the largest percentage of children to the clinics.

In both referral processes, legal issues can be raised. In the case where a parent brings the child to a reading clinic without the knowledge of the school, the question of privacy arises. Does the examiner have a duty to inform the school of such referrals? Or, is the reading examiner bound to remain silent unless otherwise instructed by the parent? The duty to inform the school does not exist in this instance unless parental permission is obtained. The *Buckley Amendment (General Educational Provisions Act* section 438 (Title IV, PL90-247), 1974, amending the *Elementary and Secondary Education Act* (ESEA), 1965.) and other Right to Privacy Acts (most states have passed statutes providing the right to privacy.) seems to be the controlling legal force. The data in this study indicates that while a large number of clinics notify the child's school of the diagnosis, they usually seek parental permission. However, approximately four percent report they either rarely or never contact the parent or guardian.

In the case where a school refers a child to a reading clinic, does the clinic have an obligation to obtain permission from the parents, or does it simply need to inform the parent of the diagnostic testing, or does it need to tell the parents anything? Clinics responding to this point indicate that generally they notify the parent of the diagnosis. However, approximately four percent indicate that they do not notify the parents. Two percent of the respondents only sometimes give parents the opportunity to object to or stop the diagnosis.

The final situation where both the parents and the school are aware of the reading testing presents no legal problems. The parents or guardians still, however, have the same legal protections afforded to them by PL 94-142.

The Interview

Approximately 99 percent of the clinics indicate that prior to diagnostic testing, parents are interviewed in order to gain background information about the child. This information most likely involves specific details about the child both prior to and after birth, his or her relationship to other individuals, and school related information. Again, a major concern with this clinical practice is confidentiality of information. All information obtained in this interview must conform to the provisions of the *Buckley Amendment*.

The results of the data show that approximately 18 percent of the clinics either always or sometimes film or tape the interview. Of those 18 percent, 82 percent either always or sometimes play the films or tapes in classes for instructional purposes. Eighteen percent of these clinics indicate that they never obtain permission from parents for filming, taping, or graduate student observation.

Another concern in the interview phase is the presence of a student in the interview, or having the interview conducted by a student. In this study, approximately 77 percent of the clinics allow graduate students to observe the interview. If a student (or students) is to observe the interview, permission must be obtained from the parents or guardians prior to the interview. If the interview is to be conducted solely by a student, the supervisor should determine prior to the interview the student's qualifications to conduct the interview. The right to a "qualified examiner" is protected by PL 94-152.

TESTING PROCEDURES

A majority of the clinics responding to the questionnaire report that graduate students do the testing. Most often these are supervised graduate students enrolled in practicum courses. Approximately 96 percent of the clinics feel that graduate students are qualified examiners. Approximately 88 percent of the clinics use graduate students to do the testing. Their training most often includes actual or simulated experiences in graduate courses.

Approximately 98 percent of the clinics indicate that they either always or sometimes inform the parent that the testing is done by a novice examiner. Two percent rarely notify parents.

Clinical Assessment

The clinical assessment in reading most often takes the form of a standardized battery of tests which includes a test of intellectual functioning and standardized achievement tests. Of the clinics who responded to this question, the most widely used diagnostic reading tests are the *Durrell Analysis of Reading Difficulties* (32 percent), the *Spache Diagnostic Reading Scales* (30 percent), and the *Gates McKillop Reading Diagnostic Test* (17 percent). The respondents indicated that the Informal Reading Inventory is also widely used in the assessment of children (33 percent).

Cultural bias of standardized tests is one of the major factors in special education litigation. PL 94-142 specifically prohibits the use of bias tests. In this study the findings show that the majority of clinics make inadequate compensations in the testing to insure it is valid for children from different cultural backgrounds.

The Clinical Report

The issue as to the ownership of the clinical report is not an easy one to answer. Once again, The *Buckley Amendment* sheds some light on the confusion. Educational institutions or agencies are prohibited to release any part of a student's record to anyone without specific parental consent.

If the parents initiate the referral without the school's knowledge, the report should be sent *only* to the parents. In this case, the school would be a third party. If the parents consent to have the report sent to the school, then, of course, this is permissible. The findings of this study showed that a majority of the clinics send a copy of the child's report to the school. However, six percent of those who send this report do not ask parental permission, but 92 percent do inform the parents that the report is being sent.

Approximately 88 percent of the clinics responding to the questionnaire indicate they either always or sometimes sent a report to the school. This was often a technical type report. Sixty-nine percent send an identical copy but others (93 percent) sent parents a summary report.

Follow-Up

In this day of educational enlightenment, one would assume that school authorities would have adequate background to understand the reading diagnostician's report and take appropriate action. Unfortunately, this is not always the case.

Exactly where the reading diagnostician's legal responsibility begins and ends is uncertain. Some courts may release the reading supervisor from responsibility after the report has been sent to the appropriate parties while another court may view the "duty to inform" as a duty to follow-up. While 91 percent of the clinics report sending recommedndations to schools, only 37 percent report either always or sometimes following up on the report to see if the recommendations are being heeded. In any event, the clinical facilities have a legal obligation to assure that the report is not being misused by the school. The findings of this study show that approximately 77 percent of the clinics either rarely or never check to see that the report is being misused.

OVERALL CONCLUSIONS

The findings of this study indicate that currently a small percentage of reading clinics are involved with evaluative practices which are ignoring the rights of children. These practices may eventually lead reading clinics into legal involvement. For example, the data show that some clinics do not notify parents for permission to conduct the testing if the child was recommended by the school without the parents' knowledge. A number of clinics report filming and taping the client during testing without obtaining permission from parents to do so.

Another important finding of this study is the clinic's inability to make adequate compensation for the cultural bias of tests. For example, one clinic reports adding ten points to an intelligence test if the child was black. The majority of responses show a lack of understanding of the cultural bias issue.

In terms of follow-up, a large percentage of clinics do not contact the schools to determine how the case case report is being used.

Overall, these findings suggest that some current practices used by clinics are in violation of certain Right to Privacy Acts as well as certain mandates outlined in Public Law 94-142. Consequently, reading clinics should adopt a standard set of guidelines which protect the child as well as the reading clinic or diagnostician.

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EARLY PREDICTION OF READING SUCCESS: PROFILES OF GOOD AND POOR READERS

The major purpose of this study was to further enhance the research base in identifying variables during the primary grades which may be predictive of literacy achievement during the junior and senior high school years.

The reading process is indeed complex. As emphasized in Ruddell's communication model (1974, 1976), the developing reading process requires the coordination and integration of perceptual, syntactic, semantic, and interpretive systems as well as the development of cognitive strategies and affective mobilizers enabling the child to effectively process incoming information. The development of these systems is influenced by instruction in the school as well as by social and economic influences in the home and community. The prediction of reading achievement is thus not a simple problem. At least three expectations may be established. First, because of the complexity of the systems involved and the wide range of individual differences found in beginning readers, no single factor or skill can be expected to be most predictive for all children. Second, since reading is a developmental process, the factors predictive of reading performance will change relative to reader maturation. And third, the basic nature of some predictive factors may result in continued predictive value regardless of the reader's maturation.

A brief review of research findings supports the predictive validity for a number of specific factors. Developmental reading readiness variables such as auditory-motor integration, visual-motor integration, auditory- and visual-perception, memory, and letter matching demonstrate predictive validity from kindergarten into the early grades. These factors, however, contribute little to prediction after grades 2 and 3 (Holmes, Stout, Rosenkrantz, Bickham, & Schnockenberg, 1975; Satz & Friel, 1973; Satz, Friel, & Rudegeair, 1976; Stevenson, Parker, Wilkinson, Hegion, & Fish, 1976; Wallbrown, Wallbrown, Engin, & Blaha, 1975).

Language and reasoning skills such as categorization, picture-naming, listening comprehension, and expressive language performance show early predictive validity. In addition, these variables account for an increasingly larger percentage of reading achievement variance in grades 2 and 3 and into the middle grades (De Hirsch, Jansky, & Langford, 1966; Jansky & de Hirsch, 1972; Staz & Friel, 1973; Satz, Friel, & Rudegeair, 1976; Stevenson, Parker, Wilkinson, Hegion, & Fish, 1976). The increasing importance of language and reasoning skills in the upper-primary and middle grades coincides with the need for interpretation of extended discourse and reflects a developmental shift in reading requirements.

HYPOTHESIS OF STUDY

The following hypotheses served to focus the direction of the study:

1. Reading comprehension achievement in grades 1, 2, and 3 will contribute significantly to the achievement variance at grades 8, 9, and 10 for

the following dependent variables: reading total (CTBS), vocabulary (CTBS), comprehension (CTBS), language total (CTBS), reading attitude (Estes), written language (Delta).

2. Listening comprehension achievement in grades 1, 2, and 3 will contribute significantly to the achievement variance at grades 8, 9, and 10 for the following dependent variables: reading total (CTBS), vocabulary (CTBS), comprehension (CTBS), language total (CTBS), written language (Delta), GPA — English (teacher), oral language rating (teacher).
3. Word analysis achievement in grades 1, 2, and 3 will contribute significantly to the achievement variance at grades 8, 9, and 10 for the following dependent variables: reading total (CTBS), vocabulary (CTBS), comprehension (CTBS), written language (Delta).
4. The independent variables of reading comprehension, listening comprehension, and word analysis will contribute variance to the dependent variables of reading total, vocabulary, comprehension, and written language at each grade level in the following order: listening comprehension > reading comprehension > word analysis.
5. The socio-economic status rating for subjects in grades 1, 2, and 3 will contribute significantly to the achievement variance at grades 8, 9, and 10 for the following dependent variables: reading total (CTBS), vocabulary (CTBS), comprehension (CTBS), reading attitude (Estes), language total (CTBS), written language (Delta), GPA — English (teacher), oral language rating (teacher). It was further hypothesized that the SES variable would contribute increasingly to the predictive effect at higher grade levels.

The following exploratory question dealt with achievement profiles for high- and low-achievers:

Will achievement profiles based on the relative differences of reading comprehension, listening comprehension, and decoding achievement score for high- and low-achievers in grades 1, 2, and 3 assist in explaining the predictive relationship between these independent variables and the dependent variables tested in grades 8, 9, and 10?

METHOD

Subjects and Data Collection

The independent variable data for the study were collected in the spring of the 1970-71 academic year at Washington Elementary School in Berkeley, California. This primary-grade school participated in a federal project known as Project DELTA — an acronym for Development Excellence in Literacy Teaching Abilities (Ruddel & Williams, 1972).

The 522 students enrolled in kindergarten and grades 1, 2, and 3 were evaluated at appropriate grades on the basis of the *Metropolitan Readiness Test* and the *ETS Cooperative Primary Tests of Reading Comprehension, Word Analysis,* and *Listening Comprehension.* From 12A of the Reading Comprehension and Listening Comprehension Tests was administered to subjects in grades 1 and 2, and Form 23A for each test was administered to students in grade 3. Form 13A of the Word Analysis Test was administered to all students in grades 1, 2, and 3. A sub-sample of the total population was evaluated on the basis of selected variables. These included oral and written language production, teachers' ratings of oral language ability, a spelling inventory, and an inventory assessing standard and nonstandard language preference. An SES rating based on the *California Socio-Economic Scale of Urban Occupations* (Ruddell & Williams, 1972) was also determined for each child.

Of the 522 children from the 1970-71 study, 193 remained in the Berkeley Unified School District as of September 1977 — approximately 37% of the original group. Of this group, parental permission was obtained for 132 students to be excused from English classes for two testing sessions in the spring of 1978. A comparison of the ethnic and SES composition of subjects across the three grade levels with the 1970-71 composition revealed close similarity with the greatest difference of 10% occurring between grades 2 and 3 at SES level 4.

The dependent variable data collected on each student at grades 8, 9, and 10 consisted of the following: reading total score for the California Test of Basic Skills (CTBS); vocabulary subtest for the CTBS; comprehension subtest for the CTBS; reading attitude — evaluated by the Estes Attitude Scale; language total score for the CTBS; written language, Delta sample — based on the Multiple-Picture Stimulus from Project DELTA and evaluated by the Delta Written Language Inventory (Ruddel & Williams, 1972), which includes evaluation of fluency of language, quality of thought, quality and control of syntactical complexity, and organization of expression; grade-point average (GPA) in English classes — calculated by averaging semester grades earned in English from grade 7 to the last grade earned; oral language rating by teacher — based on the Delta Oral Language Inventory, which accounts for quality of thought, organization of expression, quality and control of language, fluency of language, and personal response to language.

Data Analysis

For purposes of this study, only subjects in grades 1, 2, and 3 were selected for analysis. This provided for consistent data on key variables across these three grades. Of the 113 subjects in these grades, 18 were eliminated because they were either retained or accelerated by one grade level. Missing data, though small, were estimated using the Breakdown procedure.

Because the Ns for each group were small, a reduction of the set of independent variables and dependent variables by factor analysis could not be pursued. Instead, self-selection of the independent and dependent variables was performed. A correlation matrix with all the independent and dependent variables for each group was obtained. Independent variables were selected on the basis of magnitude of correlations and the following research-derived criteria constructs: (a) "Inferential Comprehension" — represented by the ETS Reading Comprehension variable; (b) "Verbal Organizational Ability" — represented by the ETS Listening Comprehension variable; (c) "Decoding Fluency" — represented by the ETS Word Analysis variable; (d) "Home Background" — represented by the Socio-Economic Status variable.

A multiple stepwise regression analysis was performed on each of the dependent variables using the selected set of independent variables. Because the units of the independent variables were not the same, standardized partial regression coefficients were used to determine the relative importance of each independent variable.

153

Achievement profiles were developed for high- and low-achieving students for grades 1, 2, and 3. Raw scores for the independent variables were converted to percentile scores for those students falling into approximately the top 33% and the bottom 33% of the sample at each grade level. The percentile scores for the independent variables of reading comprehension, word analysis, and listening comprehension were then used as the basis for the profiles.

FINDINGS, CONCLUSIONS, AND DISCUSSION

The R^2 and standardized partial regression coeffiecients for predictions from grade 1 to 8 are found in Table 1. Predictions from grade 2 to 9 and grade 3 to 10 are presented in Tables 2 and 3, respectively.

TABLE 1
R^2 and Standardized Partial Regression Coefficients (β)
For Group 1 (Grade 1 to Grade 8)

Dependent variables	R^2	Betas for the independent variables							
		Reading		Listening		Word analysis		SES	
Reading total	.40*	–		.46	(.33)	–		.29	(.07)
Vocabulary	.29*	–		.34	(.21)	–		.31	(.08)
Comprehension	.42*	–		.52*	(.37)	–		.25	(.05)
Reading attitude	.17	.41	(.17)	–		–		–	
Language total	.39*	.23	(.05)	.50*	(.34)	–		–	
Written language	.16	–		–		.40	(.16)	–	
GPA–English	.23	–		–		.33	(.15)	.29	(.08)
Oral language	.25	–		.31	(.17)	–		.29	(.08)

NOTE: Variance contributed by independent variables is shown in parentheses.
* $\leq .05$.

TABLE 2
R^2 and Standardized Partial Regression Coefficients (β)
For Group 2 (Grade 2 to Grade 9)

Dependent variables	R^2	Betas for the independent variables							
		Reading		Listening		Word analysis		SES	
Reading total	.59*	.27	(.05)	.40	(.40)	–		.29	(.14)
Vocabulary	.54*	–		.55*	(.45)	–		.33	(.10)
Comprehension	.48*	.46*	(.40)	.34	(.08)	–		–	
Reading attitude	.17	.41	(.17)	–		–		–	
Language total	.22*	–		.47*	(.22)	–		–	
Written language	.60*	.89*	(.57)	–		–		.32	(.08)
GPA–English	.28	–		–		.33	(.20)	.30	(.08)
Oral language	.17	–		.23	(.05)	–		.43	(.13)

NOTE: Variance contributed by independent variables is shown in parentheses.
* $\leq .05$.

TABLE 3

$\underline{R}^2$ and Standardized Partial Regression Coefficients (β)
For Group 3 (Grade 3 to Grade 10)

		Betas for the independent variables							
Dependent variables	$\underline{R}^2$	Reading		Listening		Word analysis		SES	
Reading total	47*	–		.29	(.08)	–		.52*	(.39)
Vocabulary	.36*	–		.43*	(.28)	.30	(.08)	–	
Comprehension	.41*	–		–		–		.65*	(.41)
Reading attitude	.29*	–		–		–		.53*	(.29)
Language total	.33*	–		–		.23	(.04)	.43*	(.29)
Written language	.30*	.55*	(.30)	–		–		–	
GPA–English	.22	–		.25	(.06)	.48*	(.16)	–	
Oral language	.08	.30	(.08)	–		–		–	

NOTE. Variance contributed by independent variables is shown in parentheses.
*Significant at family .05.

In regard to hypothesis 1, based on data presented in Table 1, it was concluded that the independent variable of reading comprehension from grade 1 contributes only a slight degree of variance to the language achievement variable at grade 8 (.05). The latter variable evaluates usage and vocabulary appropriateness. More significant is the contribution to reading total (.05) and reading comprehension (.40) at grade 9 as shown in Table 2. This finding was to be expected; however, it was also expected that a similar contribution would be made in grade 8 and grade 10 data. It was further concluded that the greatest contribution made by the independent variable of reading comprehension was found at grade 9 (.57) and grade 10 (.30) relative to the written language variable as presented in Tables 2 and 3, respectively. This writing variable is based on the evaluation of student compositions developed from a multiple-picture sequence of three related pictures and represents an assessment of fluency of language, quality of thought, quality and control of syntactical complexity, and organization of expression. It would thus appear that this shared variance may be accounted for in part by language fluency, organization, and control of syntactical complexity. These findings parallel those identified in the recent work of Evanechko, Ollila, and Armstrong (1974).

It was concluded in regard to hypothesis 2 that the independent variable of listening comprehension contributes greatest to the reading total (.33, .40, .08) and vocabulary (.21, .45, .28) variables at grades 8, 9, and 10 and to comprehension (.37, .08) at grades 8 and 9. These findings were to be expected, and the magnitude of the contribution is comparatively large. While the shared contribution may be attributed to word knowledge and inferential comprehension, two additional explanations are proposed. It is possible that subjects who are able to deal with a wider range of social functions of language — including the formal style present in the listening comprehension test at grades 1, 2, and 3 — may not only acquire a more elaborate vocabulary store from a wider range of social settings over the years but may also be more effective in dealing with a formalized style in printed text. Further, it is expected that internal representation of various types of narrative and expository writing schemata may prove to be of substantial value in organizing information and in developing expectancies in both the listening and reading comprehension setting. Pragmatics and discourse analysis both have much to offer reading research in leading to a better understanding of the nature of the comprehension process.

Regarding hypothesis 3, it was concluded that the word analysis variable contributes little to the prediction of reading and language achievement at grades 8, 9, and 10. At grade 10, as shown in Table 3, a small contribution (.08) is made to the vocabulary variable. The early research review revealed that the predictive power of this variable was decreasing substantially by grade 3. Nevertheless, it was believed possible that "decoding fluency" might indirectly influence reading comprehension and possibly written language. This was obviously not the case.

Hypothesis 4, prioritizing contributions of independent variables in the order of listening comprehension, reading comprehension, and word analysis, was confirmed. This prediction was based in part on the early research which clearly suggests that language achievement factors load heavily in predicting academic success. In addition, the previous discussion on pragmatics as related to the individual's ability to shift to a formal language style often required in oral comprehension settings and the importance of text organization and text expectancies also support prioritizing listening comprehension over reading comprehension. The low priority of word analysis as a contributing factor to prediction is found in the mastery of decoding components by the great majority of subjects by grades 8, 9, and 10.

In regard to hypothesis 5, it was concluded that the independent variable of socio-economic status contributes consistently to prediction of reading total (.07, .14) and vocabulary (.08, .10) at grades 8 and 9. A substantial contribution is made to reading total (.39), comprehension (.41), reading attitude (.29), and language total (.29) at grade 10. As predicted, there is a consistent increase in the contribution made by the SES variable at higher grade levels. This may be attributed to the increasing effect of social and economic conditions in the home which directly or indirectly affect achievement press, attitude toward school, and other academically-related factors.

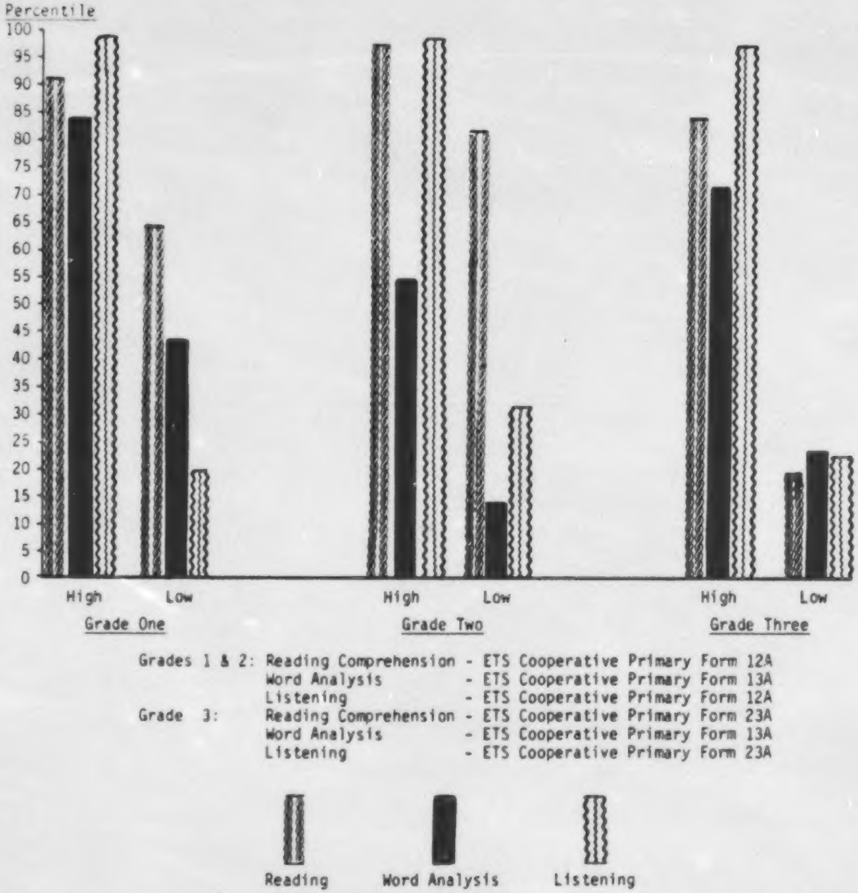
The exploratory question connected with the study pursued the explanatory value of independent variable achievement profiles for high- and low-achievers. Figure 1 presents profiles of high- and low-achievers for the independent variables of reading comprehension, word analysis, and listening comprehension.

The three variables presented in each of the profiles for high-achievers are remarkably consistent for all three grades. This profile of high reading comprehension and high listening comprehension suggests that these subjects are highly efficient in comprehending information, whether presented in written or oral form. One might surmise that although the subjects' word analysis or decoding achievement is relatively depressed at grades 2 and 3, this places little handicap on the subjects' reading comprehension. A logical analysis would suggest that these students are highly effective in using written context and possess the ability to attend to and process oral language at a highly efficient degree.

Profiles of the low-achievers, on the other hand, suggests a very different set of achievement abilities. Reading comprehension for grades 1 and 2 is relatively high. At grades 1 and 2 context clues appear to be relied on successfully, as indicated by word analysis achievement which is consist-

156

FIGURE 1
Profiles of High and Low Achievers
Independent Variables
(High Group N = 10 Low Group N = 10)



Grades 1 & 2: Reading Comprehension - ETS Cooperative Primary Form 12A
Word Analysis - ETS Cooperative Primary Form 13A
Listening - ETS Cooperative Primary Form 12A
Grade 3: Reading Comprehension - ETS Cooperative Primary Form 23A
Word Analysis - ETS Cooperative Primary Form 13A
Listening - ETS Cooperative Primary Form 23A

ently lower. The marked difference in these profiles, however, when contrasted with the high-achievers, is the extremely low listening comprehension achievement levels. The depressed listening comprehension extends across grades 1, 2, and 3. This profile could possibly suggest that the low-achievers are having difficulty in attending to and comprehending the formal speech style found in the listening comprehension test and may be unable to organize the oral presentation for efficient recall. For example, it is hypothesized that difficulty may be experienced in informational recall because of inability to use major text organization clues in processing narrative and expository material. Whatever the reason, one would expect a compounding educational deficit to build as academic experiences progress over a seven-year period for these subjects. Based on the R^2 values found in Tables 1, 2, and 3, the independent variable of listening comprehension makes high and consistent contributions to the dependent variables of reading total, vocabulary, and language total. One might tentatively conclude that the depressed listening comprehension achievement level shown in Figure 1 offers an important clue to achievement variation of the low academic achievers in this study. The profiles would appear to be of value in offering possible explanations for the relatively high predictive contribution made by the independent variable of listening comprehension.

FUTURE RESEARCH NEEDS

There is need for continued research which will contribute knowledge to our understanding of achievement variation from primary grades through secondary school levels. Specific attention must be focussed on the low-achiever if critical intervention variables are to be identified and tested. High priority should be given to the following areas:

1. The study of the way in which transition is made from social uses of language in a range of oral language settings to the comprehension of printed text. The study of pragmatics has much to offer in this area. For example, how does a decontextualized and depersonalized formal text affect the reader's comprehension? What variety of language styles must be accounted for in text settings relative to the comprehension process? How can instruction be designed to bridge spoken language and printed text in order to engage the reader more effectively with different printed language styles?
2. Consideration should be given to the wide range of schemata which aid in establishing expectations in text and affect the "unfolding" of information contained in text. Discourse analysis will be of value to the reading researcher in this regard. For example, how can schematic clues and expectations contribute to the reader's expectations and organization of information for recall? Will the utillization of the expectations be influenced by the listener's or reader's stage of intellectual development? If so, how? How can these schemata be incorporated into instructional settings to enhance organization and recall of information and result in knowledge gain for the student?
3. The investigation of the effect of the reader's or listener's perception of the value of information and the retention of information must be explored. Reader affect must be given careful consideration in this regard. For example, how does the individual's attitude toward and perception of the academic setting and text content influence comprehension and information retained? How can listener and reader motivation be enhanced to encourage more extensive reading and further academic excellence?

The pursuit of knowledge which will enable researchers to better understand these questions is critical if reading educators are to have impact on the low-achieving student and to expand the academic horizon for those students who are moderate- and high-achievers.

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A RESOURCE FOR ADULT ILLITERATES: MAIL-ORDER CATALOGS

Those of us who work with older students with low reading achievement, have long realized the dearth of suitable reading material for these people. There is increased interest lately in publishing instructional workbooks and kits to meet their needs. However, the need is so pressing to get the materials on the market, that field trials seem to be very brief and little revision of materials is evident.

Older students with limited reading and math skills need materials that are appropriate to their immediate lives. Most available material at their reading level is far too immature socially, educationally and culturally.

Yet, we have been blind to excellent material which has been with us all of our lives — the mail-order catalog, the Wish Book. The use of mail-order catalogs could fill many of the educational and cultural gaps for our older students. There would be no age, social, racial, georgraphical or occupational limitations. Sexism? A womens' lib group may have analyzed a catalog as to the ratio of male vs. female models, clothing items, or tools of trade, but it is doubtful that a bias would be evident in this type of material.

Most important, though, is the catalog's relevancy to NOW. Our older students purchase clothing, an infinite variety of tools for both home and occupational use, home furnishings and appliances, automotive accessories and countless sundry items. These items are important ingredients in every day of their lives.

One of the major educational needs of our teenage and older students is in the area of consumer education. A 1976 study in Duval County, Florida, of school children through twelfth grade indicated an abysmal lack of knowledge in the areas of money management, shopping skills, use of credit, services, insurance, and completion of forms for applications for credit and ordering goods. All of the above are thought of as consumer skills, but each of these abilities involve language skills, particularly reading and writing, with heavy vocabulary exposure.

The catalog is particularly appropriate for teaching and reinforcing the following five skill areas:

Vocabulary (multiple meanings and multiple functions of words, descriptive words, foreign words, abbreviations)
Classification (by function, description, size, geographic location)
Critical reading (comparing-contrasting, separating fact from opinion, examining exaggerations, sequencing)
Location skills (main index, special indexes, guide words)
Research skills (use of consumer information guides, comparative shopping with other catalogs and on-the-shelf items; skimming and scanning)

Opportunities abound for reading and using tables and charts, filling in order forms and computing costs. Math skills are constantly called into use in meaningful situations.

A few examples of reinforcement tasks in each skill area will give us a quick idea as to the magnitude of possibilities. (Let's keep in mind that the learner should be involved in doing, not just filling in blanks or checking a printed response.) We are aware that writing is a strong reinforcer for retaining reading vocabulary. When possible, require the page number where answers are located. Most items are pictured, but when they write the responses they need to use correct spelling. Insisting on writing the page number indicates that they are using location skills, and reading the material, rather than drawing on previous information which might partially answer the question.

Students' answers will vary according to the catalog used. This is to be desired as a basis for discussions in comparing information and increasing communication skills.

Examples:

1. To sleep warmly, what different items could you put on your bed?
2. There are many types of beds in which a child could sleep. Write the name of all of them you can find.
3. Find a page of things you can play music on. List them in alphabetical order.
4. List all the items you could wear on your feet.
5. What could you wear on your hands?
6. You decide to clean up your room. Find everything you can put trash in.
7. If I received a gift certificate for $10.00, I would want to order something that would cost as close to $10.00 as possible. I would order:
   ITEM PAGE PRICE
   I would ______ owe more money
   ______ get over 50 cents change
   ______ come out about even
8. The index lists many different kinds of some items. Write the kinds of these items that you can find.
   TOWELS TIRES HOOKS MOTORS
9. I want to give my friend pool balls for his birthday. I can look in the index under POOL or BALLS. They are on page ______.

Catalog activities should, of course, carry over into everyday living. Assignments can last for several days as students compare and contrast quality, utility, function and prices. Small groups or pairs can work together to plan and carry out projects.

The material is free, relevant, instructional and entertaining.

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THE ACCURACY OF ADULT DISABLED READERS' PERCEPTIONS OF THEIR OWN READING DIFFICULTIES

A continuing concern of adult educators has been to determine the areas of reading difficulty experienced by adults attending high school completion programs (Fay, 1966; Otto & Ford, 1967; Bowren & Zintz, 1977). In an effort to minimize initial testing, an *Adult Reading Survey* (ARS) was developed to measure self-perceptions as related to reading ability.

METHOD

Adult education students (N=184), ranging in ages from 15 to 68, were asked to respond to the ARS. This survey, consisted of 9 items related to specific reading and word recognition skills. Portions of the *Test of Adult Basic Education,* Form M (TABE) (Tiegs & Clark, 1967) and the *Botel Reading Inventory* (Botel, 1970) were used to verify the problem areas indicated by students on the ARS. *Powell's Informal Reading Inventory Scoring Criteria* (Beery, Barrett, Powell, 1973) was used to delineate the problem/no problem areas as computed at the frustration levels of the TABE scores. On the *Botel,* a maximum of 5 errors in 15 was established as an indication of a problem/no problem area (McNinch & Carmichael, 1973).

RESULTS

The Kendall Tau-β formula was used to determine levels of accuracy between the students' self-perceptions and actual test results. The highest correlations were found in the following items: middle and ending sounds, inference and vocabulary.

The correlations between overall perception and overall reading ability indicated that better readers had a tendency to be more accurate in their perceptions. The data also indicated that less able readers were not accurate in their perceptions; they were not able to identify their weak or strong abilities. If students perceive themselves as poor readers, testing is needed in order to determine specific weaknesses.

DISCUSSION

The Adult Reading Survey, which was developed to measure students' self-perceptions as related to reading ability, can be useful as a screening device with adults and can be utilized to eliminate unnecessary testing. If students perceive themselves as poor readers, testing is needed in order to determine specific weakneses. If students perceive themselves as good readers, the chances are that their responses will be accurate.

TABLE 1.
Accuracy of adult disabled readers' perceptions reported in percentages and correlations.

	ADULT READERS WHO PERCEIVED A PROBLEM		ADULT READERS WHO PERCEIVED NO PROBLEM		KENDALL'S TAU-β	
	% correct	% incorrect	% correct	% incorrect	β	N
BEGINNING SOUNDS	3.8	96.2	97.9	2.1	.05	149
MIDDLE SOUNDS	38.6	61.4	90.9	9.1	.33	149
ENDING SOUNDS	17.8	82.2	93.4	6.6	.33	149
VOWEL SOUNDS	38.2	61.8	71.3	28.7	.10	149
MAIN IDEAS	70.1	29.9	45.9	54.1	.16	182
DETAILS	20.5	79.5	99.0	1.0	.16	182
INFERENCE	72.9	27.1	66.4	33.6	.38	183
FOLLOWING DIRECTIONS	37.9	62.1	88.2	11.8	.26	181
VOCABULARY	50.0	50.0	87.3	12.7	.40	147

β correlation between test scores and self perceptions.

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READING ABILITY, COLLEGE GRADES, AND ATTRITION: A TWO-YEAR STUDY

The prospect of offsetting the slowed or zero growth rates in higher education by increasing the number of students who stayed in school after they enroll, points to a need to have a better understanding of the processes involved in the attrition of students. Mulka and Sheerin (1974) pointed to a lack of basic skills as a critical barrier for successfully achieving the benefits of higher education. Astin (1975) posited that GPA was more closely related to persistence than other variables. Astin (1964) also stated that the entering freshman, who is not planning to take graduate or professional work beyond the bachelor's degree is more likely to leave college.

The purpose of the present study was to investigate the relationships among: (1) reading scores, (2) college academic performance, (3) degree expectations, (4) self-assessed skills, and (5) retention. The study specifically examined the predictive value of these variables by academic area groupings and their relationship to first year grade point average (GPA) and enrollment status for the fifth semester. Also investigated was the correlation between actual reading scores, self-assessed reading ability, and degree expectations.

METHOD

Subjects

The sample consisted of 490 students who were first semester freshmen at The University of Oklahoma during the 1976-77 fall semester. A purposeful, non-random sampling procedure was employed to select the 28 day and evening Freshman English classes in the sample, which represented 19 percent of the 2,628 entering freshmen for that year.

Instruments

Two instruments were used. *The New Student Survey* was designed to obtain data related to the students' family background, academic background, interests, needs, and attitudes.

The Nelson-Denny Reading Test, form C, was used to determine reading achievement. This test is designed to measure reading vocabulary, reading comprehension and reading rate. In addition, the norms provide for a total reading score which is based on a composite of vocabulary and comprehension.

Procedure

The New Student Survey was administered to all incoming freshmen during registration. At the beginning of the fall semester, the 490 students in the sample were administered *The Nelson-Denny Reading Test,* form C.

Step-wise multiple regression analyses were performed to determine the predictive strength of the nine independent variables for first year GPA and fifth semester enrollment in each of the academic major areas. Intercorrelations were computed among the two dependent variables and the nine independent variables for each of the academic major areas.

RESULTS

The results of the multiple regression analysis and the Pearson *r* correlations for first year GPA are presented in Table 1. The results indicate that the independent variables accounted for a range of 24 to 82 percent of the variance with different variances found in each of the academic major areas. The computation of Pearson *r* correlations between first year GPA and each of the other variables resulted in statistically significant correlations in 28 cases.

The results of the multiple regression analysis for fifth semester enrollment and the Pearson *r* correlations are presented in Table 2. A range of .06 to .92 multiple correlations were found for the various academic major areas for predicting fifth semester enrollment. The Pearson *r* correlations between fifth semester enrollment and each of the independent variables range from .01 to .51.

Significant correlations were found between Nelson-Denny reading scores and self-assessed skills. The data show significant relationships between Nelson-Denny reading scores, self-assessed skills, and degree expectiations (Table 3).

DISCUSSION

Results indicate that academic accomplishment and retention in most academic major areas can be assessed with moderate reliability using *The Nelson-Denny Reading Test,* students' own self-reported degree of preparation, and degree expectations. The independent variables showed a higher predictive value for freshman year academic performance than for fifth semester enrollment status. A possible explanation for these differences may be found as the study follows the students for two more years. A number of students with a 2.0 grade average, or below, were still enrolled at the beginning of the junior year. Very likely these students will not persist to graduation.

Results support other research findings indicating that students are aware of their reading abilities and deficiencies. Possibly self-assessed skills, as reported by a survey of all entering freshman, could be used for identifying reading problems when reading test scores are not available.

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TABLE 1

Product-Moment Correlations and Multiple Correlations Between Nelson-Denny Scores and Self-Assessed Skills for Predicting Freshman Year Grade Point Averages by Academic Area

	Grade Point Average by Academic Area									
Predictor Variables	**Fine Arts (n=24) r**	**Health Prof. (n=19) r**	**Natural Sci. (n=23) r**	**Communica- Journalism (n=38) r**	**Social Sci. (n=35) r**	**Educ. (n=37) r**	**Engr. (n=57) r**	**Business (n=133) r**	**Phy. Sci. (n=19) r**	**No Major (n=68) r**
Nelson-Denny Scores										
Vocabulary	.54**	.24	.01	.45**	.27	.45**	.50***	.40***	.56*	.35**
Comprehension	.27	.09	.29	.21	.31	.41**	.41***	.41***	.44	.20
Total (V+C)	.50*	.17	.13	.39*	.33*	.49**	.50***	.44***	.61**	.28*
Reading Rate	.09	.20	.18	.03	.32*	.04	.08	.15	.21	.23*
Self-Assessed Skills [a]										
Writing compositions	.32	.14	.33	.18	.43**	.03	.03	.25**	.21	.04
Writing research papers	.20	.30	.04	.15	.32*	.14	.14	.16	.28	.17
Reading skills	.33	.01	.20	.08	.18	.43**	.07	.21*	.26	.04
Vocabulary skills	.10	.28	.13	.19	.33*	.19	.06	.17	.17	.23*
Degree expectations	.39	.17	.30	.01	.29	.06	.07	.22*	.03	.04
Multiple Correlations (R)	.43	.59	.54	.43	.30	.48	.39	.24	.82	.33

[a] Self-assessed skills were obtained from **The New Student Survey**.

* p .05.

** p .01.

*** p .001.

TABLE 2

Product-Moment Correlations and Multiple Correlations Between Nelson-Denny Scores and Self-Assessed Skills for Predicting Fifth Semester Enrollment by Academic Area

	Fifth Semester Enrollment by Academic Area									
Predictor Variables	**Fine Arts (_n_=24)** _r_	**Health Prof. (_n_=19)** _r_	**Natural Sci. (_n_=28)** _r_	**Communica- Journalism (_n_=38)** _r_	**Social Sci. (_n_=35)** _r_	**Educ. (_n_=37)** _r_	**Engr. (_n_=57)** _r_	**Business (_n_=133)** _r_	**Phy. Sci. (_n_=19)** _r_	**No Major (_n_=68)** _r_
Nelson-Denny Scores										
Vocabulary	.22	.05	.03	.07	.07	.23	.19	.13	.05	.03
Comprehension	.11	.11	.08	.03	.22	.31	.13	.16	.03	.06
Total (V+C)	.20	.07	.02	.04	.04	.30	.16	.15	.02	.01
Reading Rate	.28	.13	.44*	.05	.13	.04	.05	.06	.08	.18
Self-Assessed Skills [a]										
Writing compositions	.44*	.04	.15	.02	.07	.48**	.17	.07	.51*	.03
Writing research papers	.14	.31	.07	.38*	.15	.51***	.31*	.09	.04	.12
Reading skills	.51*	.15	.14	.23	.11	.46**	.14	.02	.21	.09
Vocabulary skills	.09	.14	.16	.17	.25	.21	.23	.03	.42	.03
Degree expectations	.35	.08	.10	.23	.08	.20	.13	.08	.44	.18
Multiple Correlations (R)	.50	.21	.45	.23	.36	.55	.17	.06	.92	.08

[a] Self-assessed skills were obtained from **The New Student Survey**.

* _p_ .05.

** _p_ .01.

*** _p_ .001.

TABLE 3

Product Moment Correlations Between Self-Assessed Skills and Degree Expectations with Nelson-Denny Total Reading Scores by Academic Area

	Nelson-Denny Scores by Academic Area									
Predictor Variables	Fine Arts (n=24) r	Health Prof. (n=19) r	Natural Sci. (n=28) r	Communica- Journalism (n=38) r	Social Sci. (n=35) r	Educ. (n=37) r	Engr. (n=57) r	Business (n=133) r	Phy. Sci. (n=19) r	No Major (n=67) r
Self-Assessed Skills [a]										
Writing Compositions	.56**	.19	.34	.33*	.48**	.39*	.10	.25**	.08	.32**
Writing Research Papers	.09	.04	.10	.05	.30	.23	.03	.15	.11	.25*
Reading Skills	.64**	.37	.30	.39*	.28	.46**	.37**	.46***	.05	.53***
Vocabulary	.59**	.26	.16	.35*	.53***	.31	.06	.38***	.20	.68***
Degree Expectations	.31	.07	.11	.06	.02	.06	.43***	.22*	.10	.19

[a] Self-assessed skills were obtained from **The New Student Survey.**

* p .05.

** p .01.

*** p .001.

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THE EFFECTS OF IMAGERY ON WORD PERCEPTION AND COMPREHENSION OF COLLEGE READERS

Recent research in the areas of imagery and facilitation offers strong evidence that imagery can function as a powerful device for learning verbal and pictorial paired-associates (Bower, 1970; Levin, 1977a, 1977b) as well as sentences (Begg & Paivio, 1969; Bobrow & Bowen, 1969; Bobrow, 1970) and paragraphs (Marschark, 1978). The facilitative effects of imagery as a learning strategy are thought to stem from its ability to serve as a strong "relational organizer" (Bowen, 1970), which acts to link items in discourse so that they form unified wholes or higher order units.

Most theoretical accounts of imaginal facilitation cite dual-coding (trace redundancy) or organizational factors in their accounts of the positive effects of imagery (Paivio, 1969, 1971; Bower, 1970; Begg, 1973). Proponents of the dual-coding theory have argued rigorously for the existence of two independent but interconnected symbolic processing systems for encoding information, one being primarily verbal or linguistic while the other is a nonverbal imaginal system. Information is encoded in either or both systems depending on variables such as instructional set and the concreteness or abstractness of the words read. Specifically, abstract words are more likely to activate verbal coding characterized by verbatim recall while concrete words and pictures are likely to activate either imaginal coding alone or both systems which together promote gist recall.

However different aspects of the mental imagery phenomenon may be described by various researchers, most seem to agree with Bower (1972), who describes the imagery construct as a way to put us in direct contact with *how* things look.

The question of how well imagery effects might transfer to the types of text processing required in reading behavior remains relatively unexplored. Studies of the effects of imagery on reading might yield insights for instructional practice as well as the coding issue key to imagery theory.

DIRECTION OF THE PRESENT STUDY

In the present study, the theoretical aspects of the dual-coding position were examined in an applied framework, with three levels of the reading process identified as the dependent variables: word perception (in word boundary task), and literal (low level) and critical (high level) comprehension as described by Bloom (1956).

The present study predicted that imagery would have differential effects at all tested levels of the reading process. Imagery was predicted to have a positive effect on the word perception task. It was also predicted that abstract materials would produce superior recall on questions at the literal level, since abstract material is coded verbatim in "verbal strings," thus producing an easier match between question and available response. The opposite pattern was predicted for higher level questions. According to the Paivio model, concrete material automatically undergoes an additional processing step through its access to imaginal store. Therefore, it was predicted that this step would ready the reader for the higher order operations such as analysis, comparison, and tests of internal and external validity identified by Bloom, and thus result in better comprehension.

MATERIALS

Peck (1978) adapted four pairs of passages from Marschark (1978), each pair consisting of one high and one low imagery passage of approximately 100 words. Each pair of passages was closely matched in subject matter and syntax, but differed according to imagery condition (High or Low). This was accomplished by substituting key content words which were either highly picturable (concrete) or non-picturable (abstract) within virtually identical sentence frames. Following is a sample of one set of passages at the 12th grade level in contrasting high and low imagery conditions:

Sample #1: High Imagery, Grade 12 Readability

When Jim Marshall worked at the courthouse he was involved in a scandal that later caused angry demonstrations. A female informer had offered to sell the district attorney some photographs and recordings showing liquor bootlegging by a county judge.

Sample #2: Low Imagery, Grade 12 Readability

When Jim Marshall worked for the government he was involved in an incident that later caused some embarrassment. An unknown informer had offered to sell the ministry of defense some secret information concerning certain activities of a high official (Peck, 1978, after Marschark, 1978).

The original passages had been rated for imagability by Marschark and adapted by Peck to control for readability, with agreement between the Fry monograph (1968) and the Dale-Chall formula (1948) serving as the criterion. An additional measure designed to verify the equal printed familiarity of words within passages was derived by comparing the mean *U* scores of each pair of passages based on all running words in each passage. *U* is a statistical measure described by Carroll as a value which represents an attempt "to estimate the true relative frequencies of the types (words) in any infinite corpus" (Carroll, 1971, p. xxix).

For the present study, eight of the Peck passages were used, four at the eighth and four at the twelfth grade level of readability. Within grade levels there were two pairs of passages, each pair comprising one theme written at contrasting high and low imagery conditions for a total of four at each grade level.

The word perception test. For the word perception task, the first 75 words of each passage were arranged in word boundary format in the discourse version. All punctuation and capitals were removed; passages were typed in lower case with one space between each letter and no additional spaces between words. The subject's task is to draw a line between word boundaries. Since no letters should be left over and time is tightly controlled, the

180

subject who makes incorrect initial decisions will be penalized by having to go back to correct these. The example below shows a word boundary sample taken from a high imagery 8th grade passage.

oncewhileworkinginaguidedmissile
plantandygardnerwasapproachedbya

The task has been shown to be sensitive to facilitative effects of context both developmentally (Goldsmith, 1975; Klein, Klein, & Bertino, 1974) and in adult reading (Klein & Klein, 1973).

The comprehension test. For each high and low imagery passage pair, seven comprehension questions were developed. Of these, three were at the literal level, necessitating verbatim recall, and four were written at higher critical levels, necessitating recoded recall. Higher level questions were written to correspond to the description of Bloom's (1956) comprehension through evaluation levels. Subjects receiving one or the other version of a set of paragraphs received identical questions for the set. This strategy was used to avoid confounding differences in question difficulty with the imagery variable. Thus the correct response for one question was the distractor for the matching paragraph.

Test packets contained two passages at one combination of imagery and difficulty levels. Each passage was followed by a word boundary task and comprehension questions. Packets were assembled to ensure that task order was counterbalanced. An identical cover sheet for all packets carried instructions and word boundary practice exercises.

METHOD

Subjects

Subjects were 32 undergraduate volunteers from a liberal arts college, part of an Eastern State University. Poor readers were enrolled in a basic reading improvement course at the college, while good readers were students in freshmen composition classes.

Design

The design was a repeated measures analysis of variance with subjects nested in the three independent variables. The independent variables were Imagery with two levels (High and Low); Readers with two levels (Good and Poor) and Text Difficulty with two levels (Hard — 12th Grade and Easy — 8th Grade). A test was also made from Form, a within subjects variable to test for possible effects attributable to differences between the two passage sets taken by each subject. The error term for between subjects variables was Subject nested within Imagery X Reader Level X Difficulty to remove variance other than effects due to treatment. The four dependent variables were word boundary score, literal, critical and total comprehension scores. All treatments were crossed and passage order was counterbalanced.

Procedure

Subjects were assigned at random to conditions of one combination of Imagery and Difficulty with 4 subjects per cell. Within the given condition subjects received two task sets. Each set consisted of a word boundary task followed by reading of the intact 100 word passage and 7 comprehension questions on that passage. After instructions and word boundary practice, tasks were administered with 45 seconds for each 75 item word boundary passage, 25 seconds for reading the intact 100 word passage and 90 seconds for comprehension. Questions were answered on the basis of recall as subjects were not allowed to turn back to examine the passage.

RESULTS

The single main effect which showed significance was reading ability for all dependent variables. As shown in Table 1 "better" readers performed in superior fashion on all tests. Effects were strong in word boundary performance $F\ (1,24) = 10.4, p < .01$, and stronger for critical $F\ (1,24) = 8.25, p < .01$ than for literal reading $F\ (1,24) = 5.93, p < .01$. Since total reading is a composite score, incorporating both literal and critical questions, it also reached significance $F\ (1,24) = 14.63, p < .01$.

TABLE 1
Cell Means and Standard Deviations for Reading Ability
(Good and Poor Readers) in 4 Text Conditions

Text Condition	**Good Readers**		**Poor Readers**	
	M	**SD**	**M**	**SD**
Word Boundary	36.31	9.47	27.97	9.66
Literal Comp.	2.75	.44	2.46	.67
Critical Comp.	2.97	.93	2.28	1.02
Total Comp.	5.72	1.05	4.75	1.30

Interaction Effects

Three significant interactions were found. In the word perception task Difficulty interacted with Reading Ability $F\ (1,24) = 7.52, p < .01$. The form of the word boundary performance is different for the two groups. While both levels of readers performed similarly on easy passages (good readers X = 33.88; poor readers X = 32.62), the shift from 8th to 12th grade readability is associated with a sharp decrement for poor readers (X = 23.31) and a substantial increase for good readers (X = 38.75).

A test of this original interaction using the Scheffe procedure (Kleinbaum & Kupper, 1978) showed significant differences ($p. < .05$) between the two reader groups on 12th grade material only.

Significant interactions between imagery and reading ability also occurred for both critical question $F\ (1,24) = 5.52, p < .05$ and total comprehension $F\ (1,24) = 8.06, p < .01$. The means for critical comprehension condition show an ordinal interaction similar in form to the Difficulty X Reading Ability interaction. Table 2 shows that while good and poor readers are close in both higher and lower levels of comprehension in the low imagery condition, patterns for high imagery differ markedly. In the high imagery condition good readers increase their scores while good readers show a slight decline.

TABLE 2
Means for Good and Poor Readers in Critical and Total Comprehension, High and Low Imagery Condition

Comprehension Level	Good Readers				Poor Readers			
	High Imagery		Low Imagery		High Imagery		Low Imagery	
	X	SD	X	SD	X	SD	X	SD
Critical	3.31	.87	2.62	.89	2.06	1.12	2.56	.51
Total	6.63	2.42	5.50	1.86	4.88	1.96	5.43	1.82

A test of this ordinal interaction, using the Scheffe procedure, found the difference in the high imagery condition to be significant ($p < .05$). The interaction for imagery and total comprehension showed a similar form and level of significance ($p < .05$).

DISCUSSION

The fact that imagery did not emerge as a main effect should not be taken as evidence degrading imagery as a relational organizer. Both the use of critical questions and the word boundary task are new to imagery research and may have introduced elements which need further study to clarify their relationship to imaging phenomena.

The emergence of the difficulty X reader group suggests the stern linguistic constraints imposed by the word boundary task. Specifically, for the distance between 8th and 12th grade levels to have caused facilitation for good readers and inhibition for poor readers implies that the task involves heavy concentration on actual decoding. Since imagery effects are thought to emerge after word perception occurs, the heavy allocation of attention to grapho-phonic features necessitated by the task may have blocked imaging effects.

In the area of comprehension results did not support the predicted pattern by which abstract material would facilitate literal comprehension. For literal questions a ceiling effect apparently intervened. With means of 2.75 and 2.46 for good and poor readers respectively, literal questions lacked sufficient difficulty for a proper test of the issue. If this age group were to be retested, future studies need to use additional length, question difficulty and tightly controlled timing for a more accurate measure.

The interaction between high imagery and critical comprehension, in the predicted direction, is not a surprising one. A recurrent finding in imagery research from the level of paired associate learning to prose processing is that high imagery serves to utilize concrete material into increasingly complex images. Most reading research points to the superior ability of good readers to deal with higher order thinking which involves another type of reorganizing and restructuring, here of text elements. The task demands of visual organization and the good readers' proclivity toward verbal reorganization form an appropriate match. Further support for this suggestion may be found by comparing means for both groups under the low imagery condition. Apparently the superior ability of the good readers to recode verbal material was not well matched with the low imagery text which was difficult to recode into a complex meaningful image.

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A COMPARISON OF SMALL GROUP AND INDIVIDUALIZED INSTRUCTION IN JUNIOR COLLEGE REMEDIAL READING PROGRAMS

In two separate analyses of the research in college reading programs both Wright (1966) and Fairbanks (1974) concluded that the effect of college reading programs is influenced by a number of factors, and both authors stressed the need for further research into specific characteristics of these programs. In a survey of college reading programs, Olsen and Swiss (1976) found that the individualization of instruction was an important characteristic of 87 per cent of the reading programs of the colleges surveyed, and that 40 percent of the two-year colleges considered the individualization of instruction to be the strongest aspect of their reading programs.

However, no empirical evidence is available to substantiate the positive effect of an individualized instructional component in college reading improvement programs. Smith (1975) compared the gains of 75 junior college students enrolled in an individual diagnostic-prescriptive program with a traditional reading improvement program. Both groups made significant gains in reading during the instructional period, but no significant differences were found in favor of the individual diagnostic-prescriptive method. Mahoney (1974) compared a didactic tutorial approach, a facilitative tutorial approach, and a traditional teacher-centered approach in college reading and study classes. All three groups made significant progress, but there was no significant difference between the three groups.

The major purpose of this study was to compare the effectiveness of individualized laboratory type instruction with small group instruction in junior college remedial reading programs.

METHOD

Subjects

The 108 subjects were chosen from students enrolled in remedial reading courses at two junior colleges in a large metropolitan area. Enrollment in the remedial reading course was mandatory because these students had not met the minimum requirements for entering freshman English courses. The subjects' reading abilities ranged from a grade score of 4.0 to 6.0 (total reading) as measured by the reading sub-tests of the *Iowa Test of Basic Skills.*

Procedure

Sixty of the 108 total subjects were randomly chosen to be taught in a small group setting (ten students) and were randomly assigned to one of six classes. the remaining 48 subjects were taught on an individualized basis in a laboratory setting.

Six instructors, each a certified reading specialist with at least two years of experience teaching reading at the junior college level, participated in the study. Each instructor taught one group of ten students for two fifty-minute periods each week, and in addition, each instructor taught eight individual students for two fifty-minute periods each week. The duration of the study was one semester.

The *Stanford Diagnostic Reading Test,* Level II, Form X, and the terminal word attack test of the *Wisconsin Design for Reading Skill Development,* Form A, were given as pretests, and a diagnostic profile chart was prepared for each subject.

Instructors were asked to emphasize word recognition, vocabulary, and comprehension skills in their teaching, but specific instructional techniques were left to each teacher's discretion. All instructors had easy access to two extensive material collections.

At the end of the semester each subject was given the *Stanford Diagnostic Reading Test,* Level II, Form Y, and the terminal word attack test of the *Wisconsin Design for Reading Skill Development,* Form B. An informal short-answer questionnaire which attempted to determine students' perceptions and attitudes about the reading course was also completed by each subject. The six instructors who participated in the study were asked to write a report which described their reactions to the two teaching situations.

RESULTS

One way univariate analyses of covariance were calculated for the word recognition, comprehension, and vocabulary posttest scores with the corresponding pretest score as covariate.

The analysis of covariance for the word recognition tests showed no significant differences between the two treatment groups, $F(1,105) = 2.57, p > .10$. The mean grade score for the subjects taught in the small group sessions was 8.77 with a standard deviation of .5611, and the mean grade score for subjects taught in individual sessions was 8.83 with a standard deviation of .6836.

The analysis of covariance for the comprehension tests showed a significant difference between the two groups, $F(1,105) = 13.45, p < .001$. The mean grade score for comprehension for the small group subjects was 9.04 with a standard deviation of .5729, and the mean grade score for subjects taught in individual sessions was 8.47 with a standard deviation of .5955.

The analysis of covariance for the vocabulary tests showed a significant difference between the two groups, $F(1,105) = 7.60, p < .001$. The mean grade score for vocabulary for the small group subjects was 9.31 with a standard deviation of .6877, and the mean grade score for subjects taught in individual sessions was 8.83 with a standard deviation of .6842.

The correlation matrix is given in Table 1.

TABLE 1

Correlation Coefficients Between Pre- and Posttest Variables

VARIABLE	1	2	3	4	5	6
Word Rec 1 Pre	-----	0.8573	0.2096	0.1204	0.5666	0.4460
Word Rec 2 Post	0.8573	-----	0.1918	0.1423	0.5162	0.5288
Comp 3 Pre	0.2096	0.1918	-----	0.8837	0.1869	0.2883
Comp 4 Post	0.1204	0.1423	0.8837	-----	0.1306	0.2777
Vocab 5 Pre	0.5666	0.5162	0.1869	0.1306	-----	0.7880
Vocab 6 Post	0.4460	0.5288	0.2883	0.2777	0.7880	-----

DISCUSSION

The major finding of this study was that the teaching of reading comprehension and vocabulary skills to remedial readers in college was more effective when done in small group sessions than in individual tutoring sessions. This result may be due to the effect of the interaction among class members in the small groups. In the informal analysis of the two teaching situations, the instructors noted that the group sessions seemed to foster longer and more in-depth discussions of the selections being read. In most instances the students in the small group sessions read fewer selections than those in the tutored sessions probably because of the longer discussion times per selection in the groups. Thus the group setting, which appeared to foster comprehension discussions, may have influenced the higher comprehension scores of the subjects taught in the small group sessions.

It had been expected that individual tutoring sessions would provide a unique opportunity for building a strong affective component into the reading program. The student attitude survey showed generally positive attitudes, but there was little difference between the reactions of the subjects taught in individual sessions or groups. The presence of an individual tutor was not perceived as especially advantageous by the students. Because most of the subjects' other college classes were very large classes, the small group sessions seemed to provide as great an affective component as the individual sessions. In fact, a few tutored students commented that being assigned to an individual tutor made them feel especially deficient. Because these students were required to take remedial reading, the assignment to an individual tutor might have been perceived more negatively than assignment to a class.

SUMMARY

The study found that the teaching of reading comprehension and vocabulary skills to college-age remedial readers was more effective when done in small group sessions of ten students than in individual tutoring sessions. These results may suggest that group discussion and interaction are an effective means for improving comprehension and vocabulary skills in junior college remedial reading classes. A completely individualized program may not provide sufficient interaction with others and may impede the teaching of comprehension and vocabulary skills.

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187

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NOTETAKING VS. NOTEHAVING: A COMPARISON WHILE STUDYING FROM TEXT

Although students are often encouraged to take written notes, little research has been conducted which empirically evaluates the efficiency of taking notes while studying textual material. The research completed has produced conflicting results. Recent studies (Howe, 1974; Howe & Singer, 1975; Hoon, 1974) have shown that groups of subjects who take notes from a passage do not perform significantly higher on posttests as compared to subjects who are allowed to read and then reread while studying. However, other studies (Kulhavy, Dyer, & Silver, 1974; Hayward & Orlando, 1978) indicated that notetakers did perform significantly better than non-notetakers on post-study tests.

DiVesta and Gray (1972) attempted to explain the interaction between taking notes and recall. They hypothesized that notetaking provided not only an external storage resource for later review, but also an encoding mechanism which allowed the learner to transcribe his own interpretations, associations and inferences while listening. Comparing groups of students who listened to lectures and took notes, to those who merely listened, DiVesta and Gray found that the number of ideas that subjects recalled was significantly influenced by notetaking. They concluded that notetaking served as a rehearsal mechanism which facilitated later recall.

The purpose of this study was to evaluate the model formulated by DiVesta and Gray with the assumption that the procedures outlined could be transferred to notetaking from text. The performance on an immediate recall test of groups of subjects who took notes while studying was compared to that of groups of subjects who did not take notes. The interaction between notetaking and the use of notes prior to a delayed recall test (notetaking vs. notehaving) was also examined.

STUDY I

METHOD

Design

The study consisted of two segments. During the first segment subjects were asked to read and study a passage. One group of subjects was allowed to take notes while reading and another group read the passage taking no notes. According to the encoding part of the model it was hypothesized that subjects instructed to take notes would recall significantly more information on an immediate recall test than subjects who did not take notes.

During the second segment, a delayed test was administered. Preceding this test, a five minute review period was provided for which the notetaking and reading groups were further subdivided. Half of each group was given experimenter-constructed notes to review while the other half of each group reviewed mentally. Thus four groups were formed. Two groups of subjects who took notes during the first session either reviewed notes (notes/notes-review) or reviewed mentally (notes/mental-review) during the review period. Two other groups which read the passage during the first session without taking notes either reviewed notes (read/notes-review) or reviewed mentally (read/mental-review) during the review period. Assuming that the effect of encoding would persist to the delayed test, it was hypothesized that the notes/notes-review group would recall significantly more information than the read/notes-review group. Further the notes/mental-review group would recall significantly more information than the read/mental-review group. To assess the effect of the external storage segment of this model the read/notes-review group was compared to the notes/mental-review group. It was hypothesized that the performance of these groups would not differ significantly, with the effect of note-having by the former group counterbalancing the effect of notetaking by the latter. Inherent in these hypotheses was the assumption that the model proposed had an additive effect. Therefore, it was hypothesized that the order means should progress linearly (from read/mental-review, to notes/notes-review).

Subjects

The subjects were college freshmen, sophomores and juniors enrolled in English literature and psychology classes at Oberlin College who volunteered to participate in the study. Forty students were randomly assigned to one of the treatment groups.

Materials

The stimulus passage consisted of a 1,500-word segment taken from a psychology textbook by Grinder (1977). The length of the passage and nature of the material were selected to represent a typical college study situation. The Fry (1968) readability formula was applied and the passage was found to be at a mid-college level.

For each of the 82 independent clauses in the segment an open-ended factual question was constructed. To ensure that all the information in the passage was equally sampled, a table of random numbers was used to select twenty questions each for the immediate test and the delayed test. Once selected, the order of the questions in each test were put in random order to reduce the likelihood that an item could be answered because it duplicated the sequence of the material within the passage.

Procedure

During the two sessions of data collection, subjects met in groups of between three and seven. At the beginning of the first session the stimulus passage was disseminated and subjects were advised that upon completion of the study-task they would be administered a 20-item recall test.

Oral instruction on the study techniques to be used were given to each treatment group. Subjects in the notetaking group were instructed to read the passage one paragraph at a time. After reading each paragraph they were to stop, recall all the important ideas, and construct a set of notes. They were to continue with the passage in the same manner until it was completed. Subjects in the reading group were instructed to read through the material as if they were reading an article, not stopping to mull over ideas. If they completed the passage they were to reread it in the same manner. Both groups were given 12 minutes to complete their assigned task. Afterwards they were given the immediate test. Four days later the subjects returned to take the delayed test. Immediately before the delayed test subjects either reviewed mentally or were provided with the experimenter-constructed notes.

Analysis

The difference in performance between the notetaking and reading groups on the immediate test was measured through the application of an independent t-test. The delayed test results were analyzed using a one-way analysis of variance. The test of the ordered means hypothesis was made via the method of linear contrasts. Raw data were used in these analyses, level of significance was set at .05, and follow-up pairwise comparisons were made using the LSD technique.

RESULTS

The results of the t-test on the immediate test data indicated that there was no significant difference between the mean number of ideas recalled for notetakers and readers (9.6 vs 10.3 respectively). These results clearly indicated that the notetakers did not perform significantly better than the readers, indeed the trend was in the opposite direction.

The one-way analysis on the delayed test also indicated that there were no significant differences among these groups. The mean number of ideas recalled by the notetakers who reviewed notes (8.6) was not significantly different from readers who reviewed notes (8.3). Also, the mean number of ideas recalled by the notetakers who reviewed mentally (8.7) was not statistically different than the readers who reviewed mentally (8.3). Although the hypothesis that readers who review notes would not differ significantly from notetakers who reviewed mentally (8.3 vs 8.3 mean ideas respectively), this result was considered meaningless because of the previously reported findings.

An examination of the notetaking literature provides some explanation of these findings. DiVesta and Gray indicated that notetaking might interfere with the processing of material if its primary purpose was for external storage. They stated that learners may by-pass review or rehearsal if they feel they have "a good set of notes" (1972, p. 8). However, in this study methodological consideration may be more significant. In studies (Kulvaey, Dyer & Silver; and Hayward & Orlando) which reported findings favoring notetakers as compared to non-notetakers, the amount of time subjects could spend with the stimulus passage was not controlled. Although results on posttest measures favored notetakers, these findings were qualified by a parallel increase in the amount of time subjects needed to complete notetaking assignments. In studies (Howe, Howe & Singer, and Hoon) reporting results favoring non-notetakers as compared with notetakers, study time was controlled. Therefore because of the demand characteristics inherent in taking notes, subjects may not have enough time to complete studying the stimulus passage.

With this as a consideration, subjects who took notes during the first session were questioned concerning the amount of the stimulus passage they completed. Only 20 percent indicated that they finished the entire passage which suggests that the time spent in formulating notes prevented these subjects from completing it. This may explain the lower immediate and delayed test scores obtained by the notetaking groups. Indeed Carver (1972), commenting on similar research (inserted questions) has argued that study time variations may account for virtually all the experimental effect favoring inserted questions.

STUDY II

A second study was undertaken to determine the effects of time spent studying the stimulus material. The only variation in procedure was to allow unlimited time for the subjects either to read the stimulus passage or read the passage while taking notes. Subjects were also instructed to record their starting and finishing times.

RESULTS

The results of the analysis of the immediate test data indicated that there was a significant difference between notetakers and readers $t(39) = 23.37$. The mean number of ideas recalled for notetakers and readers was 13.65 and 9.55 respectively. These results were accompanied by a significant difference in the amount of time the notetakers used to complete the studying of the passage as compared to the readers (18.4 vs. 10.3 minutes respectively). The one-way analysis of variance on the delayed test data indicated that there was a significant difference among these groups, $F(1,39) = 16.48$. Follow-up pairwise comparisons (LSD = 2.54) of the mean number of ideas recalled for the various groups indicated the following: (a) the notes/notes-review group (14.2) scored significantly higher than the read/notes-review group (9.8), (b) the notes/mental-review group (10.8) scored significantly higher than the read/mental-review group (6.4), and (c) the notes/mental-review group score was not significantly different than the read/notes-review group. The linear means contrast, $t(4,36) = 5.44$, for the order means was significant.

DISCUSSION

The results of the studies reported here are conflicting, therefore, conclusions as to the effectiveness of notetaking to facilitate recall of textual information, based on the DiVesta and Gray model, must be made with caution. When time for studying the stimulus passage was held constant, for the notetaking and reading groups (Study I), none of the hypotheses related to the model were supported. However, when the amount of time for studying the stimulus passage was not held constant (Study II) all the hypotheses proposed were upheld. In Study II notetakers scored significantly higher than readers on the immediate recall test which provided results supporting the encoding function of notetaking. This effect persisted on the delayed test. Subjects who initially took notes and either reviewed notes or reviewed mentally, scored significantly higher on the delayed test as compared to respective notes-review and mental-review groups who did not take notes initially. Further, the non-significant difference between the notes/mental-review and the read/notes-review group supported the hypothesis related to the external storage function of the DiVesta and Gray model that reviewing notes would facilitate post-study test performance. Finally, support for the additive effect of notetaking and notehaving, inherent in this model, was supplied by the significant linear trends contrast. Based on these results it could be inferred that the taking of notes combined with their subsequent use was more effective in facilitating recall than the use of either notetaking or notehaving or the use of neither.

However, drawing conclusions as to the efficacy of notetaking without attending to the results of the first study would be unreasonable. These data clearly indicated that the differences in performance by the notetaking groups were specifically related to the amount of time that subjects had to interact with the passage. These variations in study time may be of considerable importance with respect to the application of techniques used by learners to study from text. Faw and Waller (1976) have stated that students may not necessarily be concerned with time, but rather mastery of content material. If this is the case then taking notes and reviewing them may be beneficial especially if the extra time needed by the learner to take notes is not deemed excessive. However, in terms of optimum efficiency, a technique which improves learning contingent upon increased amounts of study time may be impractical for students to use in a typical college study situation.

In summary, the model proposed by DiVesta and Gray was adequate in explaining the effects of notetaking on the recall of textual material when time for studying the passage was not held constant. Under this condition notetakers significantly out-performed readers both in immediate and delayed recall tests. However, these results were attenuated by the non-significant differences in material recalled by notetakers and readers when time for interaction with the passage was held constant. It can be concluded that notetaking is an effective technique to use if mastery of content material is more important than efficiency. If time is a primary consideration, however, reading and rereading may be more desirable.

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AN EVALUATION OF THE EFFECTIVENESS OF A COLLEGE READING PROGRAM USING FOUR CRITERIA

Evaluation of college reading programs is essential for decision-making in terms of course improvement and for justifying the programs' existence. Yet educators are reluctant to divert monies from actual programs to evaluation (McDill, McDill, and Spreche, 1969). Research on the effectiveness of compensatory programs and practices has been limited in quality and scope, and these programs have been assailed on all sides for the paucity of reliable research (Kendrick & Thomas, 1970). However, a recent work by Grant and Hoeber (1978) provides a very comprehensive study of college basic skills programs, and reports that college reading programs are not working very well. The researchers question whether it is realistic to expect a one- or two-semester remedial program to make up for 12 years of unsuccessful education. They also point out that most developmental skills teachers are not trained in research methodology and make decisions based on feelings of intuition rather than on research data. Nevertheless, many instructors of college reading programs report that students make measurable progress in reading and many high-risk students ultimately succeed in college. These people believe their programs are working — they want research data to show that this is true.

It is difficult to identify adequately the factors that contribute to a successful college reading program which may explain the fact that the research procedures which Robinson (1950) described almost 20 years ago are still commonly used for investigating the effectiveness of reading programs. These procedures include comparison of a "reading" group with a control group in terms of scores on standardized reading tests and in terms of academic performance (grade point average and attrition.) Some researchers would define academic performance more broadly. Maxwell (1971) believes that individual course grades, particularly those which have relevance to the objectives of the reading program, are important to analyze. Alexander (1976) thinks that success, which he defines as a grade of "C" or better, in an introductory course of an academic subject is an indicator of achievement in a reading course.

In recent years several studies have reported that the attrition rate for students who have taken reading improvement courses was significantly less than that of other students (Carpenter & Sawyer, 1971; Ikenberry, Kennedy, & Field, 1966; Sawyer, 1971). Meister and Tauber (1965) reported lower than usual attrition rates among those students who were provided "special services." Anderson (1975) states that studies which use GPR as a criterion measure report mixed results. He indicates that carefully controlled studies show consistent GPR improvement in highly verbal subjects. He states this improvement is not seen in quantitative courses. Tillman (1972-73) reviewed 31 reading improvement programs and found only eight which indicated no measurable gain in GPR. However, Colvin (1968) found no significant differences on GPR or reading achievement between the experimental and control groups in his study. The results of an evaluative study indicated by Losak (1972) reveal that a large urban junior college reading-writing program did not produce any significant differences in attrition rate, in GPR or in English grades. Participants in the program did not achieve higher reading test scores than members of a randomly selected control group.

The primary purpose of the present study was to evaluate the effectiveness of a college reading program in terms of selected criteria; the secondary purpose was to add to a growing body of research in college reading. The study is similar to Losak's but it was conducted at a 4-year college in a small community in the Southeast. The initial phase was begun during a developmental college reading program by analyzing data relative to improvement in reading as measured by a standardized reading test and by examining the grades earned in English by two groups of high-risk freshman college students. Members of the experimental group had taken a reading course while members of the other group had not. The second part of the study was concerned with the progress of these students at the end of the 1977-1978 academic year when the participants would have had time to complete the sophomore year. Data relevant to their academic progress was examined to determine the attrition rate for the two groups and whether there was a difference in GPR between them.

The following hypotheses were formulated:

a) no significant difference would exist between the posttest reading scores of the experimental and control groups.

b) no significant difference would exist between the grade point ratios of the two groups at the end of the sophomore year.

c) no significant difference would exist in the grades in English between the two groups.

d) no significant difference would exist in the attrition rates for the two groups.

METHOD

Subjects

The subjects in this study (N = 201) were first year college students at a small four-year regional campus which is part of a larger university system in the Southeast. One hundred and forty-eight of the subjects took a developmental reading course and were designated as an experimental group while 53 did not and were designated as a control group.

Procedure

The *Nelson-Denny Reading Test* — Form C was administered to all entering Freshmen and was used as an instrument for placement into nine reading improvement classes. Although 201 students scored below the 36th percentile (the cut-off level for placement purposes), only nine sections of the reading course were offered. The 148 students who went through registration before the course was closed were able to take a reading course while 53 students were unable to register for the course that semester. Since the students received entry passes to registration based on their social security numbers, it was assumed for purposes of this study that placement into reading courses and ultimately into experimental or control groups was done randomly.

The 148 students who took the reading courses were in nine sections of the class and were instructed by three different instructors. No attempt was made to control the content or the presentation of material. The classes were similar only in that they taught skills and reading improvement.

All of the participants in this study took English courses — either a remedial course (n = 95) or the regular Freshman English course (n = 106). Placement into the appropriate courses was based on a writing sample which was evaluated by members of the English department. At the end of the first semester, a reading instructor went to each English class and administered the *Nelson-Denny Reading Test* — Form D. These tests were computer scored. Data relevant to the evaluation of the reading program — *Nelson Denny* Form D scores, English grades, grade point averages and attrition information — were obtained from the Computer Services Division with the cooperation of the Registrar's Office.

Data Analysis

The first and second hypotheses were tested statistically by using an analysis of variance of the posttest reading scores for the experimental and control groups and of the grade point ratios for the two groups. The third and fourth hypotheses were tested statistically by use of two 2x2 chi square tests, one for difference in attrition rate and the other for difference in English grades for the two groups.

RESULTS

There was no significant difference between the experimental and control groups on the posttest scores of the Nelson-Denny reading test nor was there a significant difference in GPR for the two groups. The results of the chi square test for difference in grades in English between the two groups were significant ($X^2 = 6.13$, $df = 1$, $p < .01$), indicating that students who took a reading course were more likely to get a satisfactory grade in English. The results of the chi square test for difference in attrition rate between the two groups were significant ($X^2 = 13.52$, $df = 1$, $p < .001$), indicating that students who took a reading course during their first semester were more likely to complete at least the sophomore year.

DISCUSSION

The students who completed a reading course did not read significantly better or earn higher grade point ratios than the students who did not take them. These results are consistent with the earlier investigations of Losak (1970) and Colvin (1968). Yet the results differ from the earlier studies in regard to English grades and attrition rate. In the present study, students who completed reading courses earned better grades in English, a course which high risk students often find difficult. Success in English would be within the framework of Alexander's (1977) definition of achievement in a reading course (a grade of "C" or better in an introductory course of an academic subject).

In this study, students who have completed a reading course stayed in

195

school through the sophomore year at a higher rate than students who did not take such a course. This result lends support to the contention (Carpenter & Sawyer, 1971; Sawyer, 1969) that students who complete reading courses have a lower attrition rate than those who do not.

Additional research is needed to identify critieria that contribute to a successful reading program. Factors such as classroom climates for learning, methods of presentation of reading and study skills and provision for individual differences should be investigated to determine their effects on the achievement of students.

It is probable that a standardized reading test does not measure the gains which take place within a reading course. Perhaps measures of the affective quality of reading improvement programs may be more appropriate than strictly cognitive concerns. These areas need further investigation. Research into the reason for lower attrition rates for students who take reading courses would provide useful information. From such research there will be an increased knowledge of and attention to the importance of reading improvement courses on the achievement of college students.

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SYMBOLIC COMMUNICATION INTERFACE FOR THE MULTIPLY-HANDICAPPED

Can children without natural speech and language effectively communicate via an alternative communication system? This question has both theoretical and practical importance. Since Itard's initial work in the nineteenth century (Lane, 1976), interest in the problem of the absence of speech has fluctuated until the present time. A variety of communication strategies for the non-speaking have been developed. Some of these strategies, such as American Sign Language (ASL), are elaborate non-vocal communication systems. Other less elaborate codes for communication boards, facial expressions, or gesturing systems are widely used in schools, hospitals and work settings by communication-impaired children and adults.

Ironically, the deaf, who are not non-speaking in the true sense of the word, have benefited most from non-speaking approaches to communication like American Sign Language or finger spelling. Only recently have the non-deaf, non-speaking population begun to benefit from comprehensive communication systems. These children or adults have significant neuromuscular disorders that inhibit the production of intelligible speech. Such conditions occur with cerebral palsy, traumatic head injury, or the neurological condition of acquired disorders, such as Reyes Syndrome or spinal meningitis. Since approximately 70% of children who have neuromuscular disorders manifest disturbances in their ability to communicate orally (Cruikshank, 1966; Denoff & Robenault, 1960; and Lehroff, 1958), there is significant demand for alternative communication systems.

The Oakland Schools Reading and Language Clinic has been providing non-speaking communication programs for handicapped children since 1974. The Clinic provides clinical and consulting services to children, parents, and professional staffs associated with 28 school districts in Oakland County, Michigan (suburban Detroit). Although Clinic staff is primarily involved in intervention programs and professional development related to the language/reading process, they began experiementing with visual forms of communication when special educators raised questions about the efficacy of speech therapy with three children. Currently there are 356 children with neuromuscular disorders enrolled in Oakland County pre-school, elementary, and high school classes. Seven local school districts share responsibility for the education of these students. A total of 21 teachers and 21 teacher assistants, in collaboration with 15 auxiliary professionals such as occupational therapists, physical therapists, speech and hearing specialists, and school psychologists provide educational and therapeutic services to the students. Neurological, orthopedic, and ophthalmological services are also available.

We have emphasized the instruction of non-speaking cerebral palsied children who were diagnosed as mentally impaired, yet who seemed to possess a high level of receptive language.

Initially, the Reading and Language Clinic began assisting teachers to use picture communication boards and an artificial visual language, the Bliss Symbolics (McNaughton, 1974). As the Clinic began receiving more requests for assistance, Clinic personnel began searching for additional communication methodologies. We obtained a variety of symbol boards, visual displays, and interfaces. With the Votrax Division of the Federal Screw Works, we created a communication board with a light scan matrix, a speech synthesizer, and a throat pick-up switch for motor-impaired children with limited hand control.

The operation of the communication board is as follows. A light scans a matrix of either pictures or symbols. When the scanning light illuminates the appropriate symbol or picture, the child emits a sound to stop the light. When the light stops, the voice synthesizer retrieves the word from its memory and produces that word. Memory capabilities allow the words to be stored and recalled when the child indicates he wants to generate a sentence. Children with pointing abilities use a number of interfaces with keyboards.

While this device has proven useful in our clinical setting, it has several problems. The vocabulary is quite small, thirty items. Therefore the device is a very limited communication system. Secondly, since it uses an automatic scan procedure with single response inputs, a user is unable to select an item with any speed. This has been noted to be the major deficency of most communication systems for the handicapped (Foulds, 1977).

In the past year additional funds from the Michigan Department of Mental Health have made it possible to expand our services. A full-time communications consultant has joined the staff, and a new relationship between Oakland Schools and New York University has led to the development of more comprehensive technology for the non-speaking handicapped.

LANGUAGE INTERFACE COMMUNICATION SYSTEMS

The Language Interface Communication System (LICOS) is designated to be the medium of productive communication for severely handicapped non-speaking children. The children view a television monitor which displays pages of a "dictionary" containing graphic representations of concepts. It can also display words, syllables, letters or pictures. The child controls the selection of a message by some form of response: voice, pressure switches, special keyboards, etc. The user may page through the dictionary, select items to create a message, and have the message presented auditorially through a speech synthesizer and visually on a television monitor in traditional orthography.

Conceptually, LICOS is analogous to an automated dictionary system. Each word or concept is represented by some graphic form such as a symbol on a "directory" page. Only one page of the dictionary may be seen at a time. The child pages through the dictionary by giving commands to the system. He can use other commands to select a concept on a page as part of a message. When the message is complete, the child may command the system so that it can be seen and heard.

In addition to the facilities LICOS offers to the non-speaking user, it provides a simple graphics editor and a speech synthesis by rule routine which enable teachers or parents to create new entries for the dictionary. Ultimately we would like to give the non-speaking child the means to modify the system. A number of input devices let the user control the operation of the system.

HOW LICOS WORKS

A parent or teacher turns on the computer and loads a program from a mass storage device such as a floppy disk. Once the program is running, it is waiting for any one of the legal commands. A user gives the program a command through a physical or auditory device and the command is immediately executed. For example, upon the command NEXT PAGE the next set of graphic symbols in the dictionary will be presented. If the user issues the command CURSOR RIGHT, the symbol locator will move to the next symbol to the right on the row. The command SELECT SYMBOL will add the symbol at the current symbol location to the message. The command OUTPUT MESSAGE will produce both a written and auditory form of the message. Thus by commanding the system, the user is able to construct messages to parents, teachers or friends.

DESIGN CONSIDERATIONS

There were a number of factors which influenced the design of LICOS. First, we know little about how we should construct efficient communication systems. Therefore, LICOS was designed to be a development system which would have both research and clinical application. It is primarily a software system. Its programs may be individually modified as we learn what factors are important to the communication system. By creating the facilities as programs and not as machines, we designed in the flexibility to modify the system continuously.

The wisdom of this approach became clear when we finished our first software module, a graphics editor. Since no single logographic system has been demonstrated to be clearly superior for use with the non-vocal children, we designed the system to be able to create any type of pictorial stimuli. Recently there has been the suggestion that syllabic systems may be more efficient than logographic systems for some of the non-vocal population (Goodenough-Trepagnie, 1978). While the argument is more theoretical than empirical, it is nice to know that LICOS may be used for both logographic systems (such as Bliss Symbolics Program, the Non-Speech Language Program or the Peabody Rebus Reading Program) or syllabic systems such as that currently being used in Quebec.

The second major design consideration stems from the variety of individual differences among the population. The child's ability to control specific muscular movement determines the type of input device which may be used. It also determines the number of distinct responses the system may receive as commands. The more responses the child can reliably make, the more efficient the system which can be constructed.

Since some children are only capable of making a single response, we must be able to have the system operate with only a single response. But limiting the system to a single response would lessen its efficiency for many of the children. For many, we could use a small number of responses to access a large number of items. For example, a child who is able to utter eleven consistent sound pattern "words", whatever the words may sound like, may be able to use vocal commands to access the system through a speech recognition device. LICOS now uses either a single response or eleven distinct responses as commands to the system. Therefore, it is very efficient when compared to single response systems. Yet it can be used as a single response system if necessary.

LICOS PROGRAM

Licos consists of five types of modular programs. It includes a new interpretive programming language designed for interaction with symbol sets. Input modules for specific input devices provide a number of ways to register commands. Output modules for graphic generation and speech output comprise the rest of the input/output routines. A dictionary contains the codes for graphic symbols, synthesized speech, and orthographic representation. Finally, a graphics editor permits the creation of new graphics units in an interaction environment.

The LICOS interpreter is a simple interactive language which recognizes eleven commands. Commands provide the user with control over access to the dictionary, selection of graphic units and message production. The user can also command the system to delete parts of his message.

The commands in Version 1.0 follow:

Home Page : Present page 1 of the dictionary.
Next Page : Present page n + 1 of the dictionary.
Back Page : Present page n - 1.
Cursor Right : Move cursor right one symbol.
Cursor Left : Move cursor left one symbol.
Cursor Up : Move cursor up one row.
Cursor Down : Move cursor down one row.
Select Symbol : Select current symbol.
Delete Symbol : Delete last symbol.
Output Message : Output the message in the message buffer.
New Message : Begin a new message.

In the future we hope to add more control commands to the interpreter so that the user may have more control over the system. Specifically, we would like the user to be able to create his own programs.

The input models consist of a series of programs designed to input a child's response, decode the nature of the response, and pass it on to the interpretive language routine for action. In the most extreme cases, a child will control the paging through the dictionary and the selection of semantic units with a single response. Although this is the least efficient mode of operation, it has been designed so that it is only a special case of the general input routines. The children who are capable of registering the eleven commands currently in the language by any of a number of different means have complete command of the system. A child can access the dictionary through voice recognition devices, Querty single hand keyboards, digital tablets and joy sticks. For example, a voice recognition device can be programmed to recognize the unique sounds produced by a particular user. These sounds can automatically be decoded as commands to the system. Thus a "non-vocal" subject can become effectively vocal for a small set of commands.

Output programs enable us to produce the graphic symbols on a television monitor. They are also responsible for writing the message in traditional orthography and producing a spoken version through a speech synthesizer.

The dictionary may consist of symbols, words, pictures, or syllable-grapheme systems. A graphic-editor program allows a teacher or parent to create new entries to the dictionary or edit previous entries. Our current system limits the symbols presented on a single dictionary page to a set made up of 104 types of features plus the upper case alphabet. The limited number of different features is not a serious limitation, as long as one is willing to have fewer entries on some dictionary pages than others.

We are assessing alternative means of producing graphic items which will not have this particular limitation.

The graphics editor enables a parent or teacher to create new graphic symbols by interacting with the graphic editor program. They can store them for later use in the dictionary. Each symbol is composed of a number of features. Each feature is created and edited in a feature matrix on a television monitor. The feature matrix is an enlarged version of the actual feature being defined. By using the commands of the graphic editor, a parent or teacher creates a series of features and puts them together to form symbols.

SUMMARY

LICOS creates a medium designed to enable non-vocal students to read and select graphic symbols to form messages. The system is composed of software modules each of which can be modified without affecting the others. The system provides a tool for both clinical and research applications. Clinically, it provides a way for non-vocal students to interact with other people through commands to the system. It also provides a research tool to investigate which features of a communication system are important for making it effective.

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A CONSIDERATION OF HIERARCHIES FOR READING INSTRUCTION

Through the years, notions about reading instruction have been buffeted by contrary viewpoints about what is important and whether instructional content can be ordered into a hierarchy. The controversy stems from a disagreement not about what should be taught as much as how it should be organized. For example, one interpretation of beginning reading instruction is that it consists of an orderly sequence of definable reading tasks. A contrasting approach assumes reading should be oriented to an interpretation and understanding of print. If instruction can be ordered, an instructional hierarchy may be postulated; if it cannot, then a hierarchy cannot be considered.

In this paper, the notion of reading skill hierarchies will be considered first from a historical perspective, reviewing the trends in early reading instruction which have led to differing instructional approaches. This is followed by a brief review of some recent findings from the fields of linguistics, cognitive psychology, and developmental psychology along with the implications for general skill hierarchy approaches.

AN HISTORICAL PERSPECTIVE

Three kinds of reading instructional programs have prevailed in the last 50 years. The first, epitomized by the early "Dick and Jane" stories and termed a *whole word,* sight, or look-say approach, centers on activities of recognizing common words from context. The second is called a *sight-phonics* approach because the whole word texts and the methodology were amended to include, or in some programs to stress, phonics instruction. The third approach is called *letter pattern* control. Texts were completely rewritten to control the frequency of occurrence of particular letter patterns in order to make the regularity of letter-to-sound relationships more obvious to the beginning reader. While this third type is often called "linguistic," it is termed letter pattern control here because letter-patterning is the essential distinguishing characteristic.

The letter-pattern controlled approach to reading instruction reflects an inclination to pull apart the reading act into definable and observable skills. In practice it diverges from the whole word and sight-phonics programs not because of an emphasis on phonics but because of the shift from word frequency control to letter-pattern control. Some argue that it is a more effective approach because phonics activities are integrated with reading practice thereby leading the reader to a practice of decoding words rapidly. Others argue that a sight-phonics approach permits an emphasis on meaningful reading from the beginning, so even though letter sound patterns may be less efficiently taught, the meaning, being more important, will not be disregarded.

While all but the first of these approaches dominate the reading field now, it was the whole word approach which initiated the break from the earlier

202

alphabetic method of teaching beginning reading. Next came sight-phonics, emphasizing a wide range of vocabulary and phonics tasks. In the 1960's came letter-to-sound correspondence patterns. With the whole-word approach, the reader is expected to induce letter-sound structures, in the sight-phonics approach these are explicitly taught, and, in the letter-pattern approach they are made apparent through the materials being read.

COMPARISON OF PROGRAMS IN TERMS OF A SKILLS HIERARCHY

Any skills hierarchy approach rests on the assumption that essential skills exist and should be taught in a particular sequence. Skill hierarchies are a suitable topic of study only if the skills are observable and measurable, can be viewed within the context of some terminal objective, and are a necessary component of reading. Consider the three types of programs from this perspective. A whole word approach does not contain separable skills since the reading act is defined quite globally as an acquisition of the meaning in print. Lessons consist of occasions for practicing the recognition of whole words and reading them in context. Difficulty of text materials is based on the number of new words presented rather than on particular skill characteristics that could be ordered.

Similarly, sight-phonics reading programs fail to conform easily to a notion of a skills hierarchy. The very reliance on the control of text by word frequency rather than by letter-pattern is the principal problem. It is not possible to organize skills systematically when there is no apparent rationale for a particular instructional sequence or when words in stories can be unrelated to or even contradicted by the letter-sound patterns being taught in the phonics lessons. For example, a child might learn that cat, rat, and *man* have a short *a* sound but could conceivably read a story about *Jane* who *saw* and *wanted* to *catch* it. The point to be made is that word selection for stories is based on ease of learning and usefulness in a story, not on the concurrent set of phonics rules children are learning. Since phonics instruction is a principal component of beginning reading, a lack of agreement between workbook exercises and story materials indicates that sight-phonics approaches do not contain decoding hierarchies that have a theoretical basis.

A letter-pattern controlled approach lends itself more comfortably to consideration as a skills hierarchy. An inherent structure can be constructed based on a reliance on the frequency with which letter-sound patterns occur in the language. It is based on the principle that patterns which occur most frequently and are relatively invariant (more predictable) should be taught before those which are less common. Commonly occurring consonant-sound patterns should be taught early (e.g., *c* and *g* taught with their hard sound, *b* with the /b/ sound and not silent as in *tomb*, and *s* with the /s/ sound rather than that represented by /sh/ as in *sure*). Short vowels should precede vowel digraphs because they occur more frequently than do other vowel patterns in one syllable words and are the basis for construction of short, easy-to-read words. However, it is not obvious where in a hierarchy to place consonant diagraphs. *Th* and *sh* are represented in very common words (e.g., *the, then, show, she*) as are *t, s,* and *h*. Whether these should be taught before, after or with the single consonants should probably depend on how letters that retain more than one sound are generally presented.

This loosely constructed hierarchy is characteristic of many letter-pattern controlled programs, though with considerable variation in the number of letter patterns presented in a year, in the methods used to teach letters, and in the number of new words presented in stories. Still, it is possible to construct a beginning reading instruction hierarchy based on the frequency of occurrence and relative invariance of letter-to-sound patterns so long as one uses a letter-pattern controlled text and makes use of the inherent regularity of the language in setting up sets of lessons.

THEORETICAL CONSIDERATION OF A DECODING SKILLS HIERARCHY

Linguistic

Linguists are concerned with formalizing what the ideal native speaker knows about his language. A set of rules which will generate all possible sentences of a language mirrors the native speaker's competence. How the native speaker actually goes about producing a sentence is a matter of performance, and while the set of generative rules will presumably be incorporated into a theory of performance, there will also be more psychological variables involved, such as memory limits, attention, etc. The relationship between the generative rules (competence) and performance has never been explicitly stated and although it is still assumed to exist, recent psycholinguistic research shows that it is far from simple.

Because of this emphasis on competence, the generative-transformational linquist would not see an obvious application of his research to a behavior such as reading. However, because linguists are concerned with explicitly analyzing language, the findings produced do yield insight into a system that the beginning reader is trying to master.

Bloomfield (1933), Fries (1963), Chomsky and Halle (1968), and Venezky (1970) among others have played a substantial role in an analysis of letter-to-sound correspondence patterns. Their work in defining pattern regularity has led to construction of letter pattern hierarchies. More recently, linguists have turned their attention to classification, definition, and organization of other aspects of language. What is the nature of phonetic coding, how is linguistic awareness related to beginning reading, and what are relationships between discourse and text structures are some questions of educational import that are being considered. Some of this work may eventually lead to the construction of other instructional hierarchies.

Developmental

Developmental studies of children's knowledge of letters, letter sounds, and words demonstrate that when children receive reading instruction, they begin to understand word parts and learn to distinguish phonemes. Huttenlocker (1964) showed that preschool children could not separate and reverse words which occur together frequently in sentences; e.g., they could repeat, "man runs," but not "runs man." Liberman (1973) found that only 17% of five-year-olds but 70% of six-year-olds could segment spoken words into phonemes. Calfee, Chapman, and Venezky (1972) obtained chance level behavior from kindergarten children in identifying initial consonant sounds of words. Bruce (1964) found that seven-year-old children, but not six-year-olds, could delete an inner consontant sound from words, e.g., *stand — sand*. These studies suggest that some basic perceptual skills may possibly be organized into a developmental hierarchy.

Another set of studies has shown that abilities to segment words and to capitalize on letter-sound regularity may also be ordered into a skills hierarchy. Calfee, Lindamood, and Lindamood (1973) found that a significant correlation between phonemic segmentation ability and reading ability was retained through grade twelve, with children rated in the lower half in terms of reading obtaining appreciably lower scores from grade two on. Venezky and Johnson (1973) studied first, second, and third graders' attempts to read nonsense words that began with a hard or soft *c* and contained a short or long vowel sound. They found that the more regular structures (hard *c* and the short vowel sounds) were easier and were related to age and reading skill. Shankweiler and Liberman (1972) found that good and poor readers alike made fewer consonant errors than vowel errors. Mason (1976), analyzing first through fourth graders' pronunciation errors, found that low ability readers, regardless of grade, gave a high proportion of short vowel substitutions; e.g., *sort* was read *sot, teem* was *tem*. High ability readers missed very few one vowel words, and with words containing two vowels, they tend to "regularize" the vowel pair; e.g., *steak* became *steke* and *cairn* was often read as *crane*. In an analysis of four and five year olds (Mason, 1977), an orderly progression from naming letters to distinguishing consonant-sounds then vowel-sounds was observed. Guthrie and Seifert (1977) found that good and poor readers learned short vowel words before long vowels even though the instruction presented both patterns at the same time. Biemiller (1970) also showed an orderly progression of decoding competency under one instructional program. However, under contrasting instructions, Barr (1972) found that children used quite different word recognition strategies. From their errors, those in the whole word program guessed words they had learned while children in the phonics program tried to sound out new words. A similar study was undertaken with Korean children (Noh, personal communiation) with a similar differentiation of word recognition strategy. Although there is some developmental support for a skills hierarchy of a decoding strategy it appears to be not independent of instruction. Thus any inherent structure of the language can be at least partially overridden by instruction.

THEORETICAL CONSIDERATION OF A COMPREHENSION SKILLS HIERARCHY

Instructional

An analysis of comprehension instruction indicates that the whole word, sight-phonics and letter-pattern control approaches do not have discernably different instructional procedures (Rosenshine, 1977). At all grades, stories are usually preceded by "motivating" (orientation to content) questions and activities and followed by assessment questions (memory for details and sequence, ability to locate information, interpret and draw inferences, and knowledge of words found in the text). Treating the three types of programs similarly, then, is there any instructional basis for breaking comprehension activity into a hierarchy of skills? The answer is still *no* according to Rosenshine (1977) because most of the major skills identified by curriculum

205

designers (detail, main idea, sequence, draw conclusion, cause and effect, words in context, interpretation, and inference) are introduced in grade one and continued through the later grades. When the same skills are taught in both early and later grades, they do not represent components of a hierarchy.

Cognitive

A review by Chi (1976) provides an enlightening introduction to roles currently played by cognitive psychologists which relate to comprehension hierarchies. It has long been accepted that adults have better memories and can learn something more quickly than can children. Chi argues persuasively that these apparent capacity differences can be attributed to differences in how the information is processed. Adults more often than chidren use memory-assisting (mnemonic) strategies of rehearsal, naming, grouping, and recoding. In addition, the great depth and complexity of adults' knowledge affects learning and memory — an ability to group or categorize information, the amount that can be organized for learning, and the ease with which it takes to recognize or remember something. It is not that children have less mental capacity than adults but that they have less knowledge and fewer strategies at their disposal for manipulating their knowledge.

This interpretation of learning and memory has profound implications for instruction, suggesting that what ought to be sequences in reading comprehension is the knowledge to be taught, not skills. Strategies for how to learn and remember what is read should follow from the experience itself of acquiring information. Following this argument, there is no basis for trying to define and order skills of comprehension. But what are some positive implications of this research? The following summaries of recent work provide some suggestions.

Type of task.

Studies by Craik and Lockhart, 1972; Moscovitch and Craik, (1976) and Jenkins (Hyde & Jenkins, 1969; Johnson & Jenkins, 1971) demonstrate that memory can be influenced by the level at which a task engages a person. A semantic encoding task, which was manipulated by asking adults to place information into meaning-related categories, encouraged deep level processing and generated better memory for the material than did a shallow, phonological encoding task (e.g., rhyming) or a visual encoding task (e.g., noting the presence or absence of letter information). In a study completed with young children (Murphy & Brown, 1975), tasks which forced semantic processing resulted in more recall than did specific instruction to memorize. These results suggest that, contrary to some practices, it could be instructionally advantageous for teachers to set up tasks which require children themselves to organize information to be learned rather than for them to copy information — which is a situation that often exists with workbook or ditto work exercises.

How the material is structured.

This topic was first illustrated by Bransford and Franks (1971) and was subsequently studied by Anderson and Ortony (1975), Thorndyke (1976), and Anderson, Pichert, Goetz, Schallert, Stevens, and Trollop (1976), among others. These studies indicate that comprehension is not a static process. Information which is heard or read is immediately structured by the hearer or listener; it is not learned or remembered in its original form. Comprehension, then, is partially dependent upon the organizational framework that the learner has available.

Organization of the text.

Text level analyses indicate effects on comprehension and recall of conceptual organization of text (Bower, Clark, Lesgold, & Winzenz, 1969; Stein & Glenn, 1975), text structure (Frederiksen, 1973), spatial integration (Bransford, Barclay, & Frank, 1972), the number of propositions in sentences (Kintsch, 1974), and repetition of propositional arguments (Manelis & Yokovich, 1976). The work by Stein and Glenn showed differences in recall as a function of the structure of the story. They proposed that children make use of a story grammer structure to comprehend stories. This work specifies the notion that a conceptual organization of text can override text information helping to explain why children learn or do not learn particular elements of stories. This work has direct implications for teaching reading and interpreting children's abilities to understand and remember stories and parts of stories.

Background knowledge.

These studies reveal that background knowledge affects the way information is structured by the learner and thus what can be learned. Originally studied by Bartlett (1932), it has recaptured the interest of psychologists, notably Anderson (Anderson, 1978, 1977; Anderson & Pickert, 1978; Anderson, Reynolds, Schallert, & Goetz, 1977; Anderson, Spiro, & Anderson, 1978; & Steffenson, Jogdeo, & Anderson, 1978). The results indicate that what is learned and remembered depends upon one's world knowledge, described here as memorial structures (schemata). This work has great import for teaching. Since one cannot assume that children have similar world knowledge backgrounds, the knowledge they do have about a topic will affect what they remember and how they interpret information. What is previously known can not only help but can also hamper the learning and recall of information.

Conclusion.

As the foregoing discussion illustrates, the view of memory currently popular provides a considerably different interpretation for reading comprehension than has been espoused by traditional learning theorists. Concurrent with this perspective shift has been an increase in the amount of research addressed to higher-level skills and the comprehension process itself. Similar trends are apparent in the developmental literature, and an inspection of these trends suggests that there is little or no support for the notion of a comprehension skill hierarchy. The developmental and cognitive studies provide a number of alternate suggestions. Some skills seem to develop gradually, such as abstracting the main idea; whereas others, like the tendency to integrate information from separate statements into a single holistic representation, appear to be present very early. If various skills appear spontaneously at different points in development, some implications regarding the distinctiveness of the different skills might follow, and some interferences about hierarchies might be drawn. However, it is not obvious that a clear developmental progression could ever be documented because, as the cognitive research indicates, mastery of any particular skill depends upon the general complexity of the task environment — complexity of the task, organization of the materials, and background knowledge of the learner. Further, analyses of instructional materials indicate that all or most comprehension skills are represented for the duration of the program. What happens is that the skills (e.g., identifying the main idea), are practiced in successively more difficult situations with more difficult tasks or materials. Essentially, a comprehension skill is not considered to be hierarchical, but rather the sophistication and flexibility with which the skill is applied may be presumed to develop over a long period of time.

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EFFECTS OF INSTRUCTIONAL EMPHASIS AND PUPIL ENGAGED TIME READING ACHIEVEMENT

The role of the classroom teacher generally is recognized as a major variable related to pupils' level of reading achievement. However, research investigations that attempt to identify generic teacher instructional variables that explain pupils' reading achievement have not been particularly productive (Farr and Weintraub, 1975; McNeil and Popham, 1973; Rosenshine, 1977). Although a lack of supporting evidence exists by which to recommend the use of a considerable number of reading instruction practices, the role of the teacher has been established as one of the major variables that determine the effectiveness of reading instruction (Artley, 1973; Bond and Dykstra, 1967; Gates, 1937; McDonald, 1976; Medley, 1977). The perceived importance of the role of the teacher in relation to pupils' reading achievement, therefore, has not diminished.

Process-product research that deals with teacher instruction as it relates directly to pupil reading outcomes is receiving increased researcher's attention. For example, researchers have explored emphases given to various areas of classroom reading (Barr, 1974-75; Rupley, 1977a, 1977b), effort exerted by the reading teacher (Blair, 1977; Frizzi, 1972), and use of reading diagnosis-prescription (Fox and Emans, 1973; Weber, 1971). In addition, research on pupil variables, such as time spent on a learning task (Bloom, 1976; Coker, Lorentz and Coker, 1976) and involvement in direct sequential instruction (McDonald, 1975; Soar, 1973; Solomon and Kendall, 1976) hold promise for identifying what is an effective reading teacher.

The purposes of the present study were to (1) continue to investigate selected reading instruction process variables employed by third and sixth grade teachers and their effect on pupils' reading achievement (Rupley, 1977a); (2) explore the differences between third grade teachers' reading instruction process variables and sixth grade teachers' reading instruction process variables; and (3) investigate the relationship between selected pupil variables — time spent on reading tasks, materials engaged in for instruction and time spent in the reading materials — and pupils' reading achievement.

METHOD

Sample

The study involved a sample of 27 third grade teachers and 31 sixth grade teachers teaching reading in self-contained classrooms in the Fort Wayne Community School System, Fort Wayne, Indiana. All of the teachers used a basal approach as their primary method of reading instruction.

Procedure

Teachers in the sample were assigned to one of five success status categories based on the pattern of mean reading achievement levels recorded for their actual 1974, 1976, 1978 classes. The five success categories were low (L), moderately low (ML), average (A), moderately high (MH), and high (H).

Success status was based on each teacher's classroom mean reading achievement in relation to predicted mean reading achievement for each of the years of interest. Least squares regression (Glass and Stanley, 1970) was used to determine predicted levels of mean reading achievement for both third and sixth grade teachers for each year of data collection, 1974, 1976, and 1978. All third grade and sixth grade classrooms, for each year, were used to generate six prediction lines. Each prediction line was based on class mean IQ scores (*Otis Lennon Mental Ability Test,* Form J, administered in the fall of 1973, 1975, and 1977) and class mean total reading achievement scores (*SRA Achievement Test,* administered in the spring of 1974, 1976, and 1978). Individual classes for the teachers in the sample were plotted in relation to the appropriate prediction line. A teacher whose class mean reading achievement fell greater than one-half a standard error of estimate above the prediction line was deemed high effective, a teacher whose class mean reading achievement fell within plus or minus one-half a standard error of estimate of the prediction line was deemed average effective, and a teacher whose class reading achievement mean fell greater than one-half a standard error of estimate below the prediction line was deemed less effective. Mean class reading achievement for all teachers in the sample was plotted in relation to the appropriate grade level and year prediction line.

Success status classification for third grade teachers (N=27) resulted in five Ls, five MLs, eight As, four MHs, and five Hs. Success status classification for sixth grade teachers (N=31) was eight MLs, fourteen As, three MHs, and six Hs.

Data Collection

The 1978 sample of teachers was administered the 1978 edition of the *Survey of Teacher Emphases and Practices in Reading Instruction* (STEPRI) (Rupley, 1975), which is designed to measure (1) the amount of instructional emphases given to eight components of a developmental reading program over a six week period, and (2) the use of selected reading instruction practices in the teaching of developmental reading.

The STEPRI instructional emphases components were (1) ongoing diagnosis, (2) specific diagnosis, (3) comprehension readiness, (4) comprehension following reading, (5) comprehension above the literal level, (6) oral reading, (7) structured reading activities, and (8) reading application. The eight components were derived using information based on the emphases components portion of the STEPRI. Teachers responded to each item by selecting one of five options that indicated the degree of emphasis given to a statement. Cronbach's alpha for this part of the STEPRI was 0.88, and reliability coefficients for the eight components ranged from 0.42 to 0.68.

The reading instruction practices part of the STEPRI were: (1) grouping schemes, (2) sequence of instruction, (3) diagnosis of reading, (4) basal activities, (5) time that pupils were engaged daily in reading activities, (6) time that pupils were engaged daily in various reading materials, and (7) classroom attendance index. Teachers responded by either writing an explanation, selecting an appropriate description, or specifying the approximate frequency of use for each of the seven areas of interest.

211

Analysis

Analysis of variance procedures were used to detect differences across the success status categories (L, ML, A, MH, H) for the following STEPRI information: (1) mean values reported by teachers for the eight components of emphases; (2) mean percentages of time that pupils were engaged daily in various reading materials; and (3) mean percentages of time that pupils were engaged daily in direct group instruction, individual instruction, seat work, recreational reading, and independent reading activities.

An alpha level of 0.15 was established apriori to data analysis. Although this alpha level deviates from those typically cited in educational and psychological research, i.e., 0.05 or 0.01, precedence for this decision can be found in the literature (Hays, 1973; Rupley, 1977a, 1977b, 1977c). An additional rationale for the use of a nontraditional significance region is that a major purpose of this long-term investigation is to identify credible instructional variables that warrant rigorous examination in natural classroom settings.

RESULTS

Analysis of variance on the mean values reported by teachers for the eight components of emphases on the STEPRI revealed a F-ratio significant at the $p < 0.07$ level, F(4, 27) = 2.53 for specific diagnosis for third grade. For sixth grade, a F-ratio significant at the $p < 0.08$ level, F(3, 27) = 2.49 was detected for ongoing diagnosis. F-ratio values for the other seven emphases components were not significant at the $p < 0.15$ level for either grade.

Analysis of variance of mean percentage of time that pupils were engaged in various reading materials revealed no significant differences for either grade across the success status categories. Between grade levels, the largest differences were noted for skill books, grade three teachers reported six percent and grade six teachers reported seventeen percent pupil engaged time; and teacher-made games, grade three teachers reported eleven percent and grade six teachers reported three percent pupil engaged time.

Finally, analysis of variance an of mean percentage of time that pupils were engaged daily in various reading instruction tasks at the third grade revealed significant Fs for independent reading at the $p < 0.05$ level, F(3, 27) = 4.02, and for individual instruction at the $p < 0.11$ level, (F3, 27) = 2.15. A significant difference at sixth grade was detected for individual instruction, $p < 0.05$, F(4, 22) = 3.75. F-ratio values were not significant at the $p < 0.15$ level for percentage of time that pupils were engaged daily in direct instruction, seat work, or recreational reading at either grade level.

IMPLICATIONS AND FUTURE DIRECTIONS

The intent of our present study was to link interim findings (Rupley, 1975, 1977a, 1977b) to the major hypotheses of this long term inquiry; namely, effective teachers of reading (MH, H) report significantly different instructional emphases than do less effective teachers of reading (L, MA, A); and effective teachers of reading (MH, H) report significantly different pupil engaged time in reading instruction than do less effective teachers of reading (L, MA, A). Interim findings for 1974 and 1976 indicated a linear pattern of emphases, favoring the effective teacher for the emphases components of ongoing diagnosis, comprehension following reading, structured reading activities, and reading application. Teachers identified as effective for the four year period reported greater emphases given to these components than did less effective teachers. The present investigation revealed, also, a linear pattern for the emphases components ongoing diagnosis and specific diagnosis. However, for the 1978 data this pattern was reversed. Teachers identified as effective for the six year period reported less emphasis for these components than did the less effective teachers.

The importance of instructional emphases appears to be a credible variable related to pupils' level of reading achievement. The use of both ongoing diagnosis and specific diagnosis significantly favored the effective teacher for data obtained in 1974 and 1976. However, based on 1978 findings, the relationship of instruction emphases to pupil reading outcomes needs to be reevaluated. The present study suggests that further explanation of how both specific and ongoing diagnosis is conducted and how the diagnostic results are used in instruction is warranted.

No linear patterns were noted for the time that pupils were engaged daily in various reading instruction tasks and their level of reading achievement. Third grade means for engaged time were highest for H and A teachers and lowest for MH and L teachers. The mean engaged time at sixth grade for individual teacher instruction was highest for A teacher, lowest for MA teachers, and similar (.01 differences) for ML and H teachers. Engaged time patterns at sixth grade for independent reading revealed the highest mean for MH teachers and the lowest mean for H teachers.

The fact that no linear patterns for pupil time engaged daily in reading instruction were noted, suggests that not only should analysis of variance be employed in future investigation, but better models and strategies need to be developed, also. Future research should consider the possibility that relationships between learning outcomes and time engaged in reading instruction are more likely to assume nonlinear rather than strict linear functional forms.

The concerns mentioned above should be addressed in future research on teacher effectiveness in reading instruction. Future research should focus on (1) instructional process variables that teachers employ in their reading instruction and (2) actual time that students are engaged in reading instruction, rather than gross measurements of time allocated. This task would require more precise data gathering in the naturalistic setting of reading classrooms over an extended period of time.

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THE COMMONEST SYLLABLES

From the literature we know that a great deal has been done to teach children how to divide words into syllables. Few attempts have been made, however, to determine what the commonest syllables are. With two exceptions (Dolch, 1938; Osburn, 1954), the inventorying of graphemic syllables has been ignored. Furthermore both of these investigations are out-of-date since they were based on reading materials and children's writings of the thirties. Thus currently they are inappropriate for most instruction and research needs. As Dewey (1950) pointed out, with respect to syllables there is no reliable data on even a small scale. For this reason, a graphemic syllable inventory based on an up-to-date source was undertaken

PROCEDURES

The most frequent 5,000 words from an edited version of the American Heritage list (Carroll, Davies, & Richman, 1971) were selected for syllabifying, using for reference the *American Heritage School Dictionary* (1972) and the unabridged *American Heritage Dictionary of the English Language* (1971). Written materials selected from grades three through nine served as the data base for the American Heritage list. The number 5,000 was selected inasmuch as numerous authorities have stated that it is a small number of words that make up most materials (Jones & Wepman, 1966).

Each of the 5,000 commonest words were coded with the number of letters in each syllable. For example, a word such as "revolutionary" was coded 312421, so that when scanning from left to right, the computer divided the word as "rev/o/lu/tion/ar/y." "Player" was coded as 42; "car," as 3.

RESULTS

None of the words among the 5,000 was comprised of more than six syllables, and six syllable words were very rare. Eighty percent of the words were either monosyllabic or two syllables in length. Interestingly, the percentages of occurrence of one syllable and two syllable words were the same, 40 percent each. The frequencies of occurrence and the percentages for the various sized words are presented in Table 1.

In all there were 9,358 syllable occurrences in the 5,000 commonest words; and with frequencies ranging from 1 to 230, 3,402 distinct or different syllables were identified. Relatively few occurred more than 50 times, while 90 percent occurred four times or less indicating that most of the syllables counted are seldom encountered in written materials. Approximately 10 percent of the distinct syllables occurred five or more times and are listed alphabetically in Table 2 and in descending frequency in Table 3. Roughly a third of these syllables could also be classified as monosyllabic words, such as "age," "air," "an," "as," and "at" to name a few. But this is not surprising since 40 percent of the 5,000 most frequent words were one syllable words. The commonest syllable was "ing." The contraction "n't" was the only one wilth a high enough frequency to appear on the list, and the single vowel syllables "a," "e," "i," "o," "u," and "y" all had frequencies of 36 or higher and thus appeared on the list.

TABLE 1

Distribution of One Through Six Syllable Words (N = 5,000)

Number of Syllables in Words	Frequency	Percentage of 5,000 Words	Cumulative Frequency	Cumulative Percentage
1	1,982	.396	1,982	39.6
2	2,001	.400	3,983	79.7
3	748	.150	4,731	94.6
4	220	.044	4,951	99.0
5	45	.009	4,996	99.9
6	4	.001	5,000	100.0
Σ or Total	5,000	1.000		

IMPLICATIONS

A second look should be given to sight word lists for beginning readers. Some revisions may be in order since many of the syllables on the alphabetical and descending frequency lists function also as monosyllabic words, such as, "cent," "point," "press," "sand," "tend," "tract," and "ward" but are not on the basic word lists. They would appear to have perceptual unit utility not only as words but as syllables. Furthermore since the syllable is viewed by some as a natural perceptual unit (Gleitman & Rozen, 1973; Savin, 1972), beginning readers might be taught the common syllables as basic sight syllables along with the basic sight words.

In addition developing a beginning reading or remedial approach based on knowledge of the commonest syllables may be warranted since it has been shown that blending two syllables is simpler than blending two phonemes (Brown, 1971). This inventory of syllabic information should aid in the preparation of such materials.

TABLE 2
Syllables in Alphabetical Order

Syl.	F.	Syl.	F.	Syl.	F.
1. a	124	57. cy	9	113. ho	5
2. ac	26	58. da	8	114. hunt	5
3. act	5	59. dan	6	115. i	112
4. ad	26	60. day	14	116. ic	11
5. af	9	61. de	55	117. ies	8
6. ag	5	62. den	10	118. il	7
7. age	8	63. der	25	119. im	9
8. air	5	64. ders	5	120. in	78
9. al	56	65. di	46	121. ing	230
10. als	5	66. dif	8	122. ings	10
11. am	7	67. dis	21	123. ion	5
12. an	39	68. dle	6	124. is	17
13. ap	19	69. dy	12	125. ish	6
14. ar	26	70. e	67	126. it	12
15. as	15	71. east	5	127. its	5
16. at	21	72. ed	114	128. jo	5
17. ate	6	73. ef	6	129. ket	8
18. au	9	74. el	18	130. la	18
19. ba	8	75. en	42	131. land	11
20. bat	5	76. ence	8	132. lands	6
21. be	30	77. end	6	133. lar	18
22. ber	12	78. ent	6	134. lat	5
23. bet	6	79. er	129	135. lead	5
24. bi	5	80. ered	6	136. lec	8
25. ble	25	81. ern	8	137. lect	5
26. bles	6	82. ers	26	138. lent	5
27. bod	6	83. es	98	139. less	5
28. bor	7	84. est	18	140. let	6
29. but	8	85. et	12	141. li	9
30. by	7	86. ev	7	142. light	11
31. ca	20	87. eve	8	143. lin	5
32. cal	20	88. ex	58	144. lo	9
33. can	12	89. fa	9	145. long	6
34. cap	6	90. fac	11	146. low	15
35. car	13	91. fect	5	147. lu	7
36. cat	7	92. fer	11	148. ly	119
37. cate	5	93. fi	15	149. ma	23
38. cen	5	94. fin	6	150. mag	10
39. cent	7	95. fish	5	151. main	8
40. char	5	96. fix	5	152. mal	5
41. ci	13	97. for	17	153. man	20
42. cial	6	98. form	6	154. mar	8
43. cir	6	99. ful	15	155. mat	6
44. cit	8	100. gan	7	156. me	7
45. cle	8	101. gen	11	157. meas	6
46. co	8	102. ger	15	158. mem	6
47. col	15	103. gi	5	159. men	9
48. com	51	104. gle	7	160. ment	26
49. come	5	105. go	6	161. ments	10
50. con	64	106. grand	5	162. mer	17
51. cor	6	107. great	5	163. mi	5
52. coun	6	108. hap	8	164. mil	5
53. cov	8	109. har	6	165. min	9
54. cu	11	110. head	7	166. mis	8
55. cul	5	111. heav	5	167. mo	13
56. cus	6	112. high	7	168. mon	9

(continued)

TABLE 2 (continued)

Syl.	F.	Syl.	F.	Syl.	F.
169. moth	5	220. ral	5	271. ters	10
170. mu	12	221. re	90	272. the	6
171. mul	6	222. read	7	273. ther	7
172. my	8	223. rec	9	274. ti	35
173. na	22	224. rect	5	275. tic	9
174. nal	8	225. rep	7	276. ties	9
175. near	5	226. ri	32	277. tin	8
176. nel	5	227. ried	5	278. ting	6
177. ner	6	228. ro	9	279. tion	83
178. ness	8	229. round	5	280. tions	26
179. net	5	230. row	5	281. tive	14
180. new	5	231. ry	37	282. tle	15
181. ni	15	232. sa	5	283. to	29
182. ning	8	233. sand	5	284. tom	5
183. no	12	234. sat	6	285. ton	7
184. nor	7	235. se	13	286. tor	13
185. n't	8	236. sec	6	287. tors	5
186. nu	8	237. self	5	288. tra	6
187. ny	14	238. sen	9	289. tract	5
188. o	51	239. sent	5	290. trav	5
189. ob	11	240. ser	6	291. tri	8
190. oc	8	241. set	10	292. tro	8
191. of	11	242. ship	5	293. try	7
192. on	13	243. si	22	294. tu	10
193. one	5	244. side	9	295. ture	18
194. op	9	245. sim	5	296. tures	6
195. or	26	246. sion	19	297. ty	39
196. ous	13	247. sions	5	298. u	36
197. out	9	248. sis	5	299. um	7
198. pa	18	249. so	16	300. un	22
199. par	15	250. some	10	301. up	8
200. part	7	251. son	15	302. ure	7
201. pe	17	252. sons	5	303. us	5
202. pen	14	253. south	6	304. va	8
203. per	29	254. stand	5	305. val	6
204. pi	13	255. su	7	306. var	6
205. play	6	256. sub	10	307. vel	5
206. ple	12	257. sug	5	308. ven	8
207. ples	6	258. sun	6	309. ver	13
208. ply	6	259. sup	8	310. vi	19
209. po	19	260. sur	10	311. vid	6
210. point	5	261. ta	16	312. vis	8
211. por	7	262. tain	11	313. ward	9
212. port	6	263. tal	9	314. way	7
213. pos	11	264. te	8	315. west	5
214. prac	5	265. ted	8	316. where	5
215. pre	14	266. tel	5	317. wil	6
216. pres	8	267. tem	8	318. win	6
217. press	6	268. ten	13	319. won	6
218. pro	28	269. tend	7	320. work	6
219. ra	17	270. ter	60	321. writ	5
				322. y	63

TABLE 3
Syllables In Descending Frequency

Rank	Syl.	F.	Rank	Syl.	F.	Rank	Syl.	F.	Rank	Syl.	F.
1.	ing	230		lar	18		mag	10		te	8
2.	er	129		pa	18		ments	10		ted	8
3.	a	124		ture	18		set	10		tem	8
4.	ly	119	60.	for	17		some	10		tin	8
5.	ed	114		is	17		sub	10		tri	8
6.	i	112		mer	17		sur	10		tro	8
7.	es	98		pe	17		ters	10		up	8
8.	re	90		ra	17		tu	10		va	8
9.	tion	83	65.	so	16	121.	af	9		ven	8
10.	in	78		ta	16		au	9		vis	8
11.	e	67	67.	as	15		cy	9		am	8
12.	con	64		col	15		fa	9		bor	8
13.	y	63		fi	15		im	9		by	8
14.	ter	60		ful	15		li	9		cat	8
15.	ex	58		ger	15		lo	9	183.	cent	7
16.	al	56		low	15		men	9		ev	7
17.	de	55		ni	15		min	9		gan	7
18.	com	51		par	15		mon	9		gle	7
19.	o	51		son	15		op	9		head	7
20.	di	46		tle	15		out	9		high	7
21.	en	42	77.	day	14		rec	9		il	7
22.	an	39		ny	14		ro	9		lu	7
23.	ty	39		pen	14		sen	9		me	7
24.	ry	37		pre	14		side	9		nor	7
25.	u	36		tive	14		tal	9		part	7
26.	ti	35	82.	car	13		tic	9		por	7
27.	ri	32		ci	13		ties	9		read	7
28.	be	30		mo	13		ward	9		rep	7
29.	per	29		on	13	141.	age	8		su	7
	to	29		ous	13		ba	8		tend	7
31.	pro	28		pi	13		but	8		ther	7
32.	ac	26		se	13		cit	8		ton	7
	ad	26		ten	13		cle	8		try	7
	ar	26		tor	13		co	8		um	7
	ers	26		ver	13		cov	8		ure	7
	ment	26	92.	ber	12		da	8		way	7
	or	26		can	12		dif	8	205.	ate	6
	tions	26		dy	12		ence	8		bet	6
39.	ble	25		et	12		ern	8		bles	6
	der	25		it	12		eve	8		bod	6
41.	ma	23		mu	12		hap	8		cap	6
42.	na	22		no	12		ies	8		cial	6
	si	22		ple	12		ket	8		cir	6
	un	22	100.	cu	11		lec	8		cor	6
45.	at	21		fac	11		main	8		coun	6
	dis	21		fer	11		mar	8		cus	6
47.	ca	20		gen	11		mis	8		dan	6
	cal	20		ic	11		my	8		dle	6
	man	20		land	11		nal	8		ef	6
50.	ap	19		light	11		ness	8		end	6
	po	19		ob	11		ning	8		ent	6
	sion	19		of	11		n't	8		ered	6
	vi	19		pos	11		nu	8		fin	6
54.	el	18		tain	11		oc	8		form	6
	est	18	111.	den	10		pres	8		go	6
	la	18		ings	10		sup	8		har	6

(continued)

TABLE 3 (continued)

Rank	Syl.	F.	Rank	Syl.	F.	Rank	Syl.	F.	Rank	Syl.	F.
	ish	6		var	6		great	5		ral	5
	lands	6		vid	6		heav	5		rect	5
	let	6		wil	6		ho	5		ried	5
	long	6		win	6		hunt	5		round	5
	mat	6		won	6		ion	5		row	5
	meas	6		work	6		its	5		sa	5
	mem	6	255.	act	5		jo	5		sand	5
	mul	6		ag	5		lat	5		self	5
	ner	6		air	5		lead	5		sent	5
	play	6		als	5		lect	5		ship	5
	ples	6		bat	5		lent	5		sim	5
	ply	6		bi	5		less	5		sions	5
	port	6		cate	5		lin	5		sis	5
	press	6		cen	5		mal	5		sons	5
	sat	6		char	5		mi	5		stand	5
	sec	6		come	5		mil	5		sug	5
	ser	6		cul	5		moth	5		tel	5
	south	6		ders	5		near	5		tom	5
	sun	6		east	5		nel	5		tors	5
	the	6		fect	5		net	5		tract	5
	ting	6		fish	5		new	5		trav	5
	tra	6		fix	5		one	5		us	5
	tures	6		gi	5		point	5		vel	5
	val	6		grand	5		prac	5		west	5
										where	5
										writ	5

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BRIDGING THEORY AND PRACTICE: AN INSTRUCTIONAL SYSTEM IN READING/LANGUAGE ARTS (K-8)

Montgomery County, Maryland is currently developing an Instructional System in Reading/Language Arts, (ISR/LA), grades K-8 which applies recent theory and research in reading, discourse analysis, language development, cognitive psychology and communication to the development of a cumulative, integrated reading/language arts program that develops communicative competence. This paper will describe how theory and research from a variety of disciplines have been applied to the design of the program. The ISR/LA includes a conceptual framework, a design for curriculum, a set of instructional purposes and performance objectives, an instructional guide containing models for classroom activities, an assessment component and a reporting component.

The overall goal of the ISR/LA is to promote growth in the student's ability to communicate purposefully and meaningfully through listening, speaking, reading, and writing. To help achieve this purpose, the program and instructional objectives are organized to develop five different areas of understanding, ability and attitude which influence language comprehension and production:

a) understanding of discourse type and form,
b) language and cognitive ability,
c) positive attitudes toward listening, speaking, reading, and writing,
d) ability to interpret discourse creatively and
e) ability to use sound/letter relationships to access meaning in context.

PROGRAM STRUCTURE

Understanding Discourse Structure

To promote growth in the student's ability to communicate meaningfully, an important principle of organization of the ISR/LA curriculum is a focus on the types and forms of discourse, since the natural unit of meaning in language is discourse (Halliday & Hasan, 1976). Recent work on the role of cognitive schema in comprehending discourse (Anderson, 1977; Bransford & McCarrell, 1974; Rumelhart & Ortony, 1977; Frederickson, 1977) and on the macrostructure organization of discourse (Grimes, 1975; Van Dijk, 1972; Marshall & Glock, 1978) supports an instructional focus on developing the student's understanding of discourse structure. Reading involves interaction between the macrostructure organization of the text and cognitive schema for that macrostructure in the student's mind; fluent comprehension is aided by familiarity with the message form itself. Experience builds differentiated schemata that permit the listener or reader to construct increasingly precise meanings for messages received. As the student reads discourse of a given form, such as the folktale, expectations for the form are roused based on past experiences with folktales, and these expectations interact with the text to make it meaningful (Propp, 1968; Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979).

Types and forms of discourse. The structure of the ISR/LA program fosters the development of schemata for comprehending discourse by ensuring students experience with six general types of discourse (narrative, expository, procedural, descriptive, dramatic, and lyric) and the more specific forms of each (e.g., novels, fables, and autobiographies in narrative). Forms have been identified for emphasis at each level, kindergarten through grade eight. Each form is emphasized at more than one level to ensure students the opportunity as they mature to develop more elaborated schemata for the characteristics of the form and for the functions the form serves in communication. Criteria governing placement of the forms at particular grade levels include the background knowledge required of students to deal with the form, the intrinsic complexity of the form itself, the developmental language and cognitive abilities of students, the availability of discourse written in the form at the appropriate level of difficulty, and integration with the content of other subject areas. The forms emphasized on the early levels are chiefly narrative, but gradually the program shifts to an almost equal focus on exposition at upper levels.

Language and Cognitive Development

In addition to schemata for discourse structure, language use in communication draws upon schemata for concepts, linguistic structures and communicative situations. These cognitive structures develop in children with maturation and experience in producing, processing and storing messages. Language development research indicates that the schemata incorporated in children's early language represent contextually given, preceptually based features of objects, actions and relationships among objects in the child's immediate experience (Bloom, 1970; Bruner, Olver & Greenfield, 1966; Nelson, 1977; Piaget, 1970). Children's schemata become more exact, more organized in terms of commonly understood categories expressed in language, and more decentered from direct personal experience, as the child matures (Bruner, Olver & Greenfield, 1966; Piaget, 1970) and receives feedback from adults about the domain to which a term applies (Clark, 1973).

Instruction in ISR/LA performance objectives is intended to stimulate the development of general schemata for concepts and language to facilitate communicative growth. Assessment of student attainment of the objectives should yield information permitting provision of instructional support where it is needed. In grades K-2, particularly, the objectives are designed to stimulate the student's ability to conceptualize general categories and relationships through discussion and reading of materials based on experiences familiar to the child. Students reading materials in print are stimulated to use relevant schemata derived from experience to interpret and elaborate relationships not expressed directly in the simple, reduced discourse written for early grades. This activity of comparing, contrasting and predicting relationships in printed discourse based on schemata derived from experience should help the student integrate new information from the text into existing schemata. Students also produce and read stories and reports about objects, animals, persons and events in their experience. Thus understanding of categorical relationships among objects, of basic concepts of time, space, position, size and comparative relationships and of the language encoding categories and relationships is developed through communication about real space and time experiences of the child.

The performance objectives dealing with knowledge of word meanings and of syntax are also grounded in developmental research. The objectives dealing with knowledge of word meanings shift from a focus in early grades on perceptual and experientially grounded meanings to categorical meanings detached from particular experiences and to meanings derived from the surrounding linguistic context of the word (Olson, 1977). The objectives dealing with understanding of syntactic structure reflect the view that maturation (Hunt, 1965), experience with sophisticated discourse (Chomsky, 1972), and precisely focused exercises and reading questions (Mellon, 1969; O'Hare, 1973; Stotsky, 1975; Obenchain, 1978) all play a role in the student's acquisition and control of syntax. Students are asked to rearrange increasingly complex sentences, to combine sentences, to supply subordinating conjunctions implicit in a text, and to complete a given sentence about reading using a logical or temporal connector not appearing in the text. Performance of these objectives should build general schemata for language applicable both to the comprehension and production of discourse.

Understanding Sound/Letter Relationships

ISR/LA performance objectives which focus on understanding of sound/letter relationships and word structure are designed to stimulate use of background knowledge and sensitivity to context in decoding. Recent research in reading indicates that beginning readers use the syntactic and semantic clues provided by the context of a story to recognize words unfamiliar to them in isolation (Goodman, 1965; Ehri, 1978). Objectives in the ISR/LA encourage students to predict unfamiliar words using information supplied by syntactic, semantic and pragmatic clues as well as by graphemic clues. Students are encouraged to bring their oral vocabularies,their knowledge of the world, their tacit knowledge of the rules of the language and their ability to test hypotheses (Brown, 1958; Smith, 1971) to bear in constructing the meaning of printed discourse. Thus decoding is seen not as a separate first step to meaning, but as an access to meaning developed in concert with other information processing strategies (Wardhaugh, 1969; Goodman, 1965; Smith, 1971).

INSTRUCTIONAL ACTIVITIES

Understanding Communicative Situations

The development of communicative competence involves more than the development of schemata for the different structures already discussed. Effective communication also entails understanding of communicative situations: the pragmatic context, the interactive processes of the participants, and the functions of language in communication. Developing students' ability to communicate effectively entails the use of teaching strategies which create discourse-centered communicative events with both a full pragmatic context and an interactive process into which the student can enter.

Pragmatic content. Effective communication draws on the ability to infer from the situation features of the pragmatic context relevant to the intended meaning of the message or discourse. The pragmatic context is created by the participants and all the knowledge and experience they bring with them, as well as by the setting, the relationships among the participants, the distance between the participants, the rules for the kinds of things they may say to one another, and the rules that determine how to understand the things that get said. By asking students to generate messages while role playing the characters encountered in discourse, the teacher can involve students in an activity that stimulates the ability to infer the pragmatic context within the discourse while also indicating to the teacher how well the student has understood the discourse and creating a communicative event among students within the classroom.

Interactive Processes. People enter communicative events with purposes. These purposes motivate what a speaker or writer will say and what a listener or reader will understand. Purpose interacts with knowledge and understanding in the production and comprehension of messages. The production activities of speaking and writing involve the following processes:

- forming a mental representation of the message appropriate to the speaker/writer's purpose;
- modifying the representation of the message to meet the needs and interests of the audience;
- producing the external form of the message for the audience.

The comprehension activities of listening and reading involve the following processes:

- attending to information relevant to the reader/listener's purpose;
- elaborating and assimilating, accommodating or rejecting information, depending on the listener/reader's purpose and existing schemata; and
- forming a mental representation of the message.

As students interact in classroom discussions and dramatizations, they exchange the roles of speaker/writer and listener/reader of discourse many times. By attending to the responses of an audience, students have the opportunity to learn more about the purposes, knowledge, values and interests of their audience and about how to form their messages to be understood easily. The ability to decenter from the child's own perspective, to take the point of view of the person to whom the child is speaking, is one that develops with cognitive maturity and with the sharing of perspectives within communication (Piaget, 1926; Flavell, Botkin, Fry, Wright & Jarvis, 1968; Glucksberg, Krauss & Higgens, 1975). As students role play characters in discourse, they have the opportunity to expand their communicative roles by assuming a variety of purposes. They may modify their ideas of what information is relevant to their purpose as they act "in terms of" situations created within the discourse (Bransford, Nitsch & Franks, 1977).

Language Functions

The functions of language occur in the context of language interactions between a speaker/writer and listener/reader. While several different taxonomies of the functions of language (Britton, 1971; Halliday, 1978; Jakobson, 1964) and of illocutionary acts (Dore, 1977; Searle, 1977) have been offered, none of the taxonomies presents a set of parallel, mutually exclusive categories adequate for describing the different uses of communication in educational settings. The list below is a working taxonomy designed to account for language use as a communicative activity.

1. Functions with focus on participants
    a) promissory
    b) transactional
    c) directive
2. Functions with focus on content
    a) informative
    b) speculative
    c) investigative
3. Functions with focus on code
    a) metacodal (talk about the code)
    b) stylistic (talk about how the code is used)
4. Functions with focus on how the code is used
    a) aesthetic

Activities in the ISR/LA encourage the student to compose in real spoken and written forms such as letters, diary entries, editorials, news stories, critiques, dialogues, dramatizations, advertisements, interviews, and autobiographies, for a variety of audiences. Students discover through generating messages that differing distances between senders and receivers of messages affect the form of the message. The activities also include experience in the effect of the various language functions in forming the message. For example, the transactional function shapes the mutual exchange of meaning characteristic of dialogue and discussion. The directive function shapes the persuasive language of advertisements and editorials. The informative function organizes the structure of ideas of written essays and oral reports. In these activities the communicative roles of reading, writing, speaking and listening are integrated as the students demonstrate reading and listening comprehension by speaking and writing. The activities cluster performance objectives in each of the five areas of understanding, attitude and ability developed in ISR/LA: understanding of discourse type and form, language and cognitive ability, positive attitudes toward listening, speaking, reading and writing, ability to interpret discourse creatively and ability to use sound/letter relationships to access meaning in context.

Proposed Assessment Measures

The proposed ISR/LA evaluation measures assess student performance on objectives in reading, writing, speaking and listening. Information produced by these measures will be used in making instructional decisions for individuals and groups, in monitoring the achievement of individuals and groups, in evaluating the program, and in providing accountability data. A variety of measures will be used to test student performance in reading.

a) Multiple-choice criterion-referenced tests using excerpts from classroom books will provide objective information to confirm student performance on reading objectives.
b) Criterion-referenced tests of whole discourse will provide information on student performance following instruction on a specific set of objectives appropriate to the discourse studied.
c) Informal assessment, including pre-reading, decoding, and comprehension checklists, will provide a record of student performance in informal classroom situations.
d) Miscue analysis, simplified for easy use, will provide information about the interaction of oral reading and comprehension abilities when such infor-

mation is needed.

The assessment package is designed to contain a limited variety of instruments balanced for objectivity and utility of information produced. As the instruments become less objective, they can account for more individual differences, an important aspect of assessment too frequently ignored (Cicourel, 1974). Such a balance should produce appropriate information for making decisions at all levels.

CONCLUSION

The theory and research in reading, discourse analysis, language development, cognitive psychology, and communication on which Montgomery County's ISR/LA draws are undergoing continuous development. The ISR/LA as well is continuing to develop and modify program structure, classroom activities, and assessment procedures based not only on theoretical advances, but also on the needs and experience of teachers and students in classrooms. Many of the issues currently being raised in the literature have not yet been resolved. Nevertheless, it is important that theory and research are providing concepts which justify educational programs such as the ISR/LA with an integrated focus on the structures that organize discourse, the cognitive structures that develop in students with experience and maturity, and the functions of language in communication.

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227

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THE DEVELOPMENT OF AN INSTRUMENT TO MEASURE TEACHER BELIEFS ABOUT READING

As part of the research being conducted at the Institute for Research on Teaching at Michigan State University, the Conceptions of Reading Project (CORP) is attempting to determine whether teachers possess beliefs about reading and, if they do, whether these beliefs influence instructional decision-making and pupil outcomes. The study is currently in its second year of observing teachers holding various beliefs about reading.

To select teachers for classroom observation, it was necessary to ascertain teacher beliefs. Consequently, one of the major initial efforts of CORP was the development of an instrument designed for this purpose. This paper describes the two-year development of a reading propositional inventory.

EARLY CONCEPTUAL DEVELOPMENT

A search of the literature (Belli, Blom, Reiser, 1977) indicated that virtually no research had been conducted on teacher beliefs about reading. Consequently, the early efforts in instrument development focused both on the conceptualization of beliefs about reading and a strategy for assessing such beliefs.

Conceptualization of Beliefs About Reading. Since the research staff was composed of a number of reading specialists, attempts to conceptualize reading beliefs initially focused on theoretical models of reading. However, such models were difficult to adapt to field research in classroom sites because of their abstractness. More concrete and pragmatic ways of conceptualizing reading beliefs were needed.

Subsequently, two literature searches of standard reading methods texts were conducted. From these, five general categories of beliefs about reading were identified: basal textbook, linear skills (such as Wisconsin design), interest-based (as described by writers such as Fader and Veatch), natural language (including both psycholinguistics and language experience) and integrated curriculum models (such as the CORE curriculum). The literature searches were used to establish the content validity of the items incorporated in the instrument.

Early Trials. CORP's first attempt to assess beliefs was adapted from Cadenhead's (1976) previous work in which propositions about reading were written on cards, with each subject being asked to examine the cards and to place in one pile the five she/he most agreed with and to place in another pile those five she/he most disagreed with. At this stage, the propositions included some from the five conceptual categories described above, others from Cadenhead's original sort, and others describing a "confused/frustrated" category. A 70 item propositional card sort resulted.

This early form of the instrument was subjected to two types of field testing.

229

First, various researchers within the Institute for Research on teaching were asked to complete the instrument and to identify items which lacked face or content validity. Second, students in two advanced graduate classes in reading instruction were administered the instrument and were asked to identify any problematic items. On the basis of both the recommendations of the subjects and the results of an item analysis of subject responses, the number of propositions was reduced from 70 to 36 items.

This form of the instrument was then administered as a third pilot to more than 300 graduate students enrolled at Michigan State University during summer, 1977 and revisions in individual items were made as a result.

SUBSEQUENT DEVELOPMENT

Following the initial pilot tests described above, the Propositional Inventory was subjected to a series of statistical analyses and subsequent revisions which ultimately resulted in the final form of the instrument. These are described in three stages.

Changing to a Likert Scale. The initial pilot work with the instrument had indicated that the sorting format was clumsy and inefficient, especially for use with large numbers of subjects. Consequently, to facilitate both administration and statistical analysis, the instrument was converted into a five-point Likert Scale, following a model more like DeFord's (1975). The six conceptual categories (the five reading positions and the "confused-frustrated" category) remained unchanged, as did the individual items.

During fall, 1977, the new format of the instrument was administered to 124 graduate students from Michigan State University and from the State University of New York at Albany and the scale items were factor analyzed and checked for reliability within the conceptual categories. The factor analysis indicated that the sub-scales grouped themselves together into three clusters: a basal text and linear skills cluster, a cluster including interest-based, natural language and integrated curriculum models and the "confused-frustrated" category. The reliability coefficients (Cronbach's Alpha) within the sub-scales ranged from .52 to .70. As a result of these data, poor or non-discriminating items were revised or replaced. In addition, the "confused-frustrated" category was eliminated at this time because it could not be validated in terms of either face or content validity.

Incorporating Results from Field Observations. The results from more than 150 observations of 10 different elementary classrooms in three states were incorporated into the instrument. Analysis of these observations revealed that, while teachers do make decisions in terms of belief categories such as basal text, there also appeared to be common dimensions across categories upon which teacher decisions were made. For instance, all teachers made decisions about the criteria for judging pupil success but their particular criteria depended upon their belief system. Hence, a teacher with basal text conception of reading tended to judge pupil success by how many levels had been completed while teachers having an interest conception judged success by the affective response to books. The other dimensions identified included: criteria for forming instructional groups, allocation of time to reading activities, allocation of time to ability groups, favored word recognition prompts, comprehension emphasis and instructional role.

These observed dimensions were then incorporated into the Propositional Inventory by including within each conceptual category a proposition for each of the seven dimensions. In addition, some of the strongest items from the previous edition were retained, regardless of whether they reflected a particular dimension or not. The result was a 50-item, Likert-scale inventory which reflected both the more theoretical conceptions found in the literature and the more practical concerns gleaned from observational data.

This form of the Propositional Inventory was then administered to 116 graduate students enrolled in reading classes at Michigan State University. The sub-scale reliability coefficients ranged from .59 to .74 while a factor analysis continued to indicate that the basal and linear skills subscales loaded on a separate factor from that of natural language, interest-based and integrated model sub-scales.

The Final Revision. After examining the above data, individual items were rewritten to improve their discrimination. In addition, the items regarding how teachers allocate time to ability groups were eliminated. Apparently, these items discriminated poorly because they suggested a conscious time injustice to particular reading groups while the differences in time allocation noted during observations may have been reflecting teachers' less conscious decisions.

Following these revisions, the final 45 item form of the Propositional Inventory was administered to 178 graduate and undergraduate students enrolled at Michigan State University during summer, 1978. The reliability coefficients are as follows: .78 for basal text; .71 for linear skills; .67 for interest-based, .71 for natural language and .62 for integrated curriculum models. A factor-analysis using a varimax rotation was conducted on the five sub-scales (Tables 1 and 2) and on the individual scale items, with a three-

TABLE 1

Two Factor Matrix of Reading Subscales

SCALE	FACTOR	
	I	II
Basal	−.26	.49
Linear Skills	−.18	.93
Interest	.74	−.26
Integrated Whole	.74	−.14
Natural Language	.67	−.36

TABLE 2

Three Factor Matrix of Reading Subscales

SCALE	FACTOR		
	I	II	III
Basal	−.22	.71	−.07
Linear Skills	−.15	.61	−.54
Interest	.71	−.27	.16
Integrated Whole	.73	−.15	.09
Natural Language	.67	−.14	.55

factor rotation showing the clearest solution among the items. As on previous forms of the instrument, the interest, natural language and integrated curriculum items loaded on a single factor ($\geq .28$). The basal text and linear skills items loaded strongly on two separate factors but shared some variation on both. That is, the two approaches had a factor complexity of two. When a three-factor solution of the five sub-scales was applied, the basal text and linear skills conceptions loaded on a single factor. As before, the interest, natural language and integrated curriculm conceptions loaded on a common, but separate, factor.

RESULTS OF THE STATISTICAL ANALYSIS

The development of the Propositional Inventory has resulted in two types of products. The first, of course, is the instrument itself. As the data described above indicate, the Propositional Inventory provides an efficient and reliable means for assessing teachers' generalized reading beliefs.

Further, the statistical data provide two interesting insights regarding teacher belief systems. First, while the literature indicates that standard reading methods textbooks tend to be categorized in terms of the five belief systems, teachers seem to consistently group themselves into two or more general categories: a "structured" conception which includes both the basal text and the linear skills conceptions and a more "unstructured" conception which includes interest-based, natural language and integrated curriculum models.

Second, to the extent that teachers do make distinctions among belief system, they tend to distinguish more between the basal text and linear skills conceptions than between the more unstructured conceptions. Apparently, teachers make fewer distinctions among the pupil-centered, humanistic approaches to reading while they are more discriminating between the structured approaches.

POTENTIAL FUTURE USES

CORP has used the Propositional Inventory primarily for selecting teachers for classroom observations. The classroom observations have predominately shown that the professed reading beliefs of teachers are consistent with their classroom practices. While it has proved valuable when used for this purpose, other uses are envisioned.

For instance, the instrument could help researchers determine how teachers view particular reading beliefs and how their decisions really differ in practice, as suggested by the data reported above which indicated that the distinctions made by various reading theoreticians representing one or another of the five conceptions are apparently not as clear to the practitioners who tend to cluster statistically into three, rather than five, conceptual categories. Further, the instrument could be used to investigate the relationship between teacher beliefs and demographic characteristics. For example, one might expect the more educated and experienced teacher to have broader, more eclectic beliefs than new and inexperienced teachers. These and other characteristics would provide descriptive and predictive knowledge about how teacher characteristics are related to conceptions. Finally, the instrument has potential for monitoring change in reading beliefs over time. For example, reading methods instructors or in-service coordinators may be able to determine the impact of instruction by using the inventory on a pre- and post-instruction basis.

CONCLUSION

The Propositional Inventory described here is an efficient and reliable tool for assessing teacher beliefs about reading. It can provide useful teacher data for the researcher and has potential for use in teacher education at both the pre-service and in-service levels.

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COMBINING UNIVERSITY AND SCHOOL-BASED INSERVICE EDUCATION IN CONTENT AREA READING

Many secondary school teachers and administrators believe that the most effective method of teaching reading in junior and senior high schools is through content area studies. If instruction in reading skills is incorporated into social studies, mathematics, industrial arts, music, and other areas, students will see a need to learn these skills. Immediate application of reading skills in content subjects reinforces skill learning and enables students to acquire content area concepts that are being presented through written materials. In contrast, reading instruction which is offered in a separate class is often not transferred to studying content materials and is therefore, likely to be forgotten because it is not applied.

Problems exist, however, in implementing the adage, "Every teacher, a teacher of reading," in junior and senior high schools. Content teachers who may be well versed in their subject areas frequently have difficulty individualizing instruction for different reading abilities due to large, changing content classes. Olivero (1976) suggests that "probably less" than one percent of the secondary teachers have ever been taught the skills of diagnosis necessary for individualization of instruction. They may simply not have had any course work in reading methods during their own preservice teacher training experience and may not be aware of how to help students read content materials (Morrison & Austin, 1977). Or they may resist teaching reading skills "by rationalizing that 'reading isn't my subject'" (Axelrod, 1975).

To test whether secondary teachers' attitudes and knowledge of reading skills could be positively changed by inservice education, the Content Area Reading Project was developed at The Pennsylvania State University and funded by the Pennsylvania Department of Education from January 1, 1976 to June 30, 1977. Instruction in content area reading was delivered at three sites—urban, rural, and suburban—in Pennsylvania to volunteer junior high school teachers during a year-long program, consisting of fifteen bimonthly sessions, each lasting three hours. University credit was available as an option for teachers who wished to register for the credits.

A competency-based format was selected since differences among the teachers were anticipated in entry levels and progress in both attitudes and skills. Teachers were provided the objectives for instruction and given multiple opportunities to master these objectives. Topics covered included diagnosis, linguistic differences, motivation, organization for instruction, reading skills development, materials selection, and evaluation of instruction. Model teaching materials—such as learning centers, skill exercises, and videotapes—were created by Project staff to demonstrate how teachers might construct and use these materials in their classrooms. A professional library was developed for each site so that teachers could complete assigned readings without having to travel to a university library.

The inservice model employed in the Content Area Reading Project (CARP) included four components:

234

1. field-based instruction by University personnel in biweekly workshops;
2. follow-up supervision in the schools by trained supervisors, working with teachers during the two weeks between workshops;
3. instruction using various media and materials to present concepts relevant to content area reading, followed by instruction in designing, developing and using these media and materials in the content area classroom; and,
4. the use of teachers as change agents so that once a group of teachers in a school are trained to incorporate reading instruction in their own classes, they become agents encouraging and training other teachers to adopt these techniques.

Field-based Instruction. The importance of working with teachers on their own turf has been stated frequently (for example, Hutson, 1979). Teachers (and other people) respond better to new ideas when they are in familiar surroundings. But outside instructors have an important advantage in that they can introduce new and sometimes uncomfortable ideas (or, if you will, create cognitive dissonance) without having to bear the brunt of teacher objections daily. The "expert" can play this role more easily than someone who works in that school on a regular basis. At the same time, these instructors must demonstrate that their expertise includes practical experience, useful relevant techniques applicable immediately to the classroom, and an understanding of the uniqueness of the particular school(s) and area. Thus, the CARP instructors brought in some theory and research findings, a good many different sources of information, and many different models of concrete techniques for teachers to use. A great deal of flexibility was required in applying the competency-based format in different schools, but the certainty of the given list of competencies provided a constant framework.

With the state-funded Project ended, its ultimate impact on Pennsylvania is grounded in a state-wide network of trained instructors, who are University faculty members in Continuing Education, available to run this program from centers all over the state. This field-based instruction is a primary component; the interaction of instructors with local concerns adds strength to the program.

Follow-up Supervision. The importance of follow-up to inservice instruction is well established. The contact people used in the Project were graduate students trained in reading and supervision who spent a minimum of one day per week in the schools between workshops. Their duties ranged from helping teachers develop lessons and techniques for the classroom to observing teachers using reading techniques in the classroom. They were even asked occasionally to demonstrate particular techniques. They found it important to restate information given in the workshops, to interpret and explain assignments, and to reinforce the models given as examples of various techniques.

These in-school supervisors were the first-line evaluators of teachers' work. They assessed teachers' use of reading techniques in their classrooms at the beginning and end of the Project. They observed teachers for inclusion of specific reading techniques, at the teachers' invitation, throughout the Project. They assessed materials for acceptance by the standards agreed upon between the University faculty and all supervisors. Faculty members retained overall responsibility for evaluation and grading, but the supervisors' assessments were critical. Only they knew the unique situations in given schools and particular classrooms. Therefore, their assessments were usually accepted. In addition, they interacted with the teachers after the assessment, reporting the result and, if necessary, helping the teacher work through an unsatisfactory assignment to "recycle" it, so that on second attempt, the assignment was satisfactory.

In applying this inservice model to a wider network, it seems clear that the in-school supervisor can most easily be drawn from the school district's own personnel, as long as the individual is one who has the respect and trust of the teachers with whom she/he will be working. Other critical variables are open interaction with other professionals, patience, some knowledge of reading, and lots of time.

Instruction and Modeling. The Content Area Reading Project was based on the assumption that teachers can change their methods of instruction to include consciously the teaching of necessary reading skills in their content classrooms. It also assumed that teachers needed to learn about new materials and resources, particularly the use of media, for their own classrooms. Therefore, workshops were planned to model different instructional patterns (lecture, mediated instruction, learning packages, learning centers, grouping in different patterns). In addition, each of the techniques and types of materials was available for teachers to examine as they tried to develop their own.

The model materials and techniques were initially produced by the University faculty and Project staff. However, the Project collected samples of each technique from teachers so that a large collection of classroom-tested model materials is now available.

The in-school supervisors are particularly valuable in helping teachers conceptualize their own content teaching and reading instruction. Because they can see both sides, these supervisors provide the connection necessary for the teachers to become conscious of what they can do with reading, and then these same supervisors can help them do it. Such a connection between theory and practice is the goal of most inservice education.

Changing Other Teachers' Behavior. A goal of inservice education has long been to change teachers' behavior. However, it usually stops with the individual teacher, who may or may not accept the change. The Content Area Reading Project aimed to work intensively with a few receptive, volunteer teachers at each site. Once these teachers had developed the skills and attitudes considered important, they were asked to become proselytes, to spread the good word to other teachers in their grade, department or team. Some teachers accepted this task eagerly. Others were reluctant.

Several changes have been made in the Program in this area, as it has become the state-wide network. In future workshops, teachers will be given specific instruction in some aspects of teacher-to-teacher interaction and the function of the change agent. Breaking down the isolation of each teacher's classroom, suggesting that both teachers and students have common needs, comes very hard in the traditional secondary school. It seems reasonable to emphasize the common areas and some techniques which have worked for other teachers, and to allow individual teachers to select those techniques which seem to fit their teaching pattern, subject, and personality. Sudden and miraculous changes are not expected nor particularly desired. Slow but continuous change is more realistic and probably more lasting. This means that teachers working as change agents need the same patience as the in-school supervisors. Indeed, teachers who enjoy the change agent role will find themselves performing the same functions and demonstrating many of the same qualities as the in-school supervisors described earlier.

School districts may find it most useful to train a cadre of teachers and other personnel by grade level and subject, and then provide them with time and support to work within several schools besides their own in this change agent role. The University involvement at this level is to provide occasional consultant service, as requested by the district, and to continue to provide materials, models, and other resources as needed for continuing change.

Teacher Skills and Attitudes in Inservice Education

Evaluation of the Content Area Reading Project focused on teacher variables—attitudes, knowledge of reading skills, and implementation of workshop objectives—since changes must occur in teacher variables before student achievement can be affected. Teachers in the three workshop sites were compared in pre and posttesting to other teachers in the same building who did not participate in the workshops on two measures of attitude toward teaching reading in the content areas as well as on a measure of general morale, the *Purdue Teacher Opinionaire* (Bentley & Rempel, 1973). While morale on the *Purdue Teacher Opinionaire* remained approximately the same throughout the school year in all sites for both the experimental and comparison groups, significant differences were found on instruments measuring attitudes toward teaching reading in the content areas. On the *Statements Survey,* a Likert-type scale (r = .84) significant differences were found at the .05 level. The *Situations Survey,* a semantic differential scale, yielded three scores, on all of which the experimental group of teachers expressed significantly more positive attitudes than the comparison group ($p < .05$). These included sets of five bipolar adjectives in response to twelve hypothetical classroom situations (Adjectives scale, r = .96); a feasibility scale on which teachers were asked to rate how feasible each situation was (r = .75); and a perceived skills score (r = .91) on which teachers expressed their confidence in implementing the diagnostic-prescriptive strategies demonstrated in the hypothetical situations.

Furthermore, on a criterion-referenced knowledge of reading skills test given only to experimental teachers, significant gains ($p < .001$) were made from the pretest to the posttest as well as many more teachers reaching the 80% mastery level on the posttest. Likewise, consultant ratings of the degree of implementation of workshop objectives, obtained through classroom observations before and after the experimental treatment, also showed significant gains ($p < .001$). The results of the Project evaluation are presented in further detail elsewhere (Dupuis & Askov, 1977; Askov, Dupuis, & Lee, 1978).

A follow-up study was conducted one year later. Since no formal inservice training was conducted at the three sites during the 1977-78 school year, it was of interest whether the positive gains in attitudes and knowledge of reading skills made during the 1976-77 school year were retained at the end of the 1977-78 school year with no further treatment. Therefore, teachers in the experimental group were retested in May, 1978, with the two attitude surveys and the criterion-referenced knowledge of reading skills test. The *Purdue Teacher Opinionaire* was not readministered since morale had remained stable during the 1976-77 school year and had not shown a relationship to positive changes in attitudes and skills in content area reading. The comparison teachers were not retested because their scores had remained fairly stable during the 1976-77 school year, and there was no reason to expect this pattern to change.

The results show that no significant differences were obtained between May, 1977, and May, 1978 (significance was set at .05). The small fluctuations in means can be expected due to the standard error of measurement in the test instruments. Detailed results are available from the authors upon request.

From the results obtained, it appears that the effects of this inservice work in content area reading done during one school year were retained one year later without continued formal inservice work. It should be noted, however, that in every case the scores obtained at the suburban site increased rather than decreased during the non-intervention year. It is also in this site that the most administrative support for content area reading instruction was apparent. Nevertheless the gains made in the urban and rural sites during the experimental treatment were retained even with little apparent administrative support. The results are encouraging in suggesting that inservice education of the kind reported here does make a difference in bringing about lasting changes in teachers' attitudes toward content area reading instruction and in their knowledge of reading skills.

The inservice model reported here includes the best of both worlds. It includes university faculty expertise, graduate credit, and facilities for statewide dissemination with reliable sources of materials. It also includes the immediacy of the school as home-base, plus school-based supervisors in touch with the immediate situation. This inservice model suggests a new partnership between local schools and universities which is long overdue.

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INTERACTIVE MODEL OF TEACHER EDUCATION

Recently, reading theorists (Rumelhart, 1976; Adams & Collins, 1977; Anderson, 1977) have proposed an interactive view of reading which posits active construction of meaning from text by the reader. In a larger framework, reading instruction can be viewed as on-going communication between teachers, learners, and texts. We, as teacher educators, find this theory congruent with our conceptualization of teachers and learners participating in a dialectic process where both change as a result of their continuing interactions. Under these conditions, the role of the teacher educator is as a guide to interns leading them to develop an interactive perspective. This perspective relates to both the act of reading and the teaching of reading in which the following interactions occur: reader/text interactions and teacher/learner interactions. The latter interactions usually occur between teacher educator and intern and between interns and learners but may be extended to include teacher educators with other teacher educators, interns with other interns, and learners with other learners if the roles of teacher and learner are broadly defined.

Interaction Between Teacher Educator and Teacher Intern

All of the above interactions should be incorporated into a fully working model of education of reading teachers. Though each set of interactions needs to be developed, this paper will address the interactions between teacher educators and teacher interns using, for illustrative purposes, diagnostic information obtained by one intern.

The contents of these interactions are reading theories, teaching practices and case study data. The use of this content facilitates the discovery by interns of the analogous structures which operate both in reader/text interaction and in teacher/learner interactions. In both communication dyads, new experiences and background knowledge are used to construct meaning. If these experiences create dissonance with existing knowledge, participants are forced to extend and/or restructure their knowledge base to incorporate new information. This new knowledge base is then utilized to interpret further experiences.

Because this paper is limited to the teacher educator/intern interaction, our college teaching laboratory situation in which the major interactive experiences are activities structured by the teacher educator for the intern and by the intern for the learner will be examined. An exchange of ideas among teacher educators leads to the development of teacher training and reading activities used in the college laboratory. Similarly, teacher interns working in groups develop activities for learners.

In the reading process the interactions take place between the reader and text. In the laboratory, reader/text interaction is followed by discussion between different pairs of participants who seek to confirm or negate their interpretation of the text under consideration. As a result of this process, the knowledge base of the participants is extended and/or restructured and used to enhance further reading.

During all laboratory experiences, the interns and their students become consciously aware of how they learn and how they read. This metacognition evolves through a number of planned discussions in which different pairs of participants share their introspections. These discussions may involve teacher educators and interns, interns with other interns, or interns with learners. Each of these communications provide for the exchange of ideas which will expand the individual's base of knowledge. It is with this changed and expanded predisposition that learners enter the next learning and/or reading experience on a new level of understanding. The results of these discussions help interns arrive at conscious awareness of the processes involved in learning and/or reading and the need to consider these processes when planning and implementing reading experiences for learning.

As teacher trainers, we have frequently observed that teacher interns act on internalized concepts of reading which are derived from their contact with commerically published materials used in their schools for reading instruction. Usually these interns are unaware of the intuitive models on which they base their instructional decisions. In our teacher education programs, a special effort is made to understand major models of the reading process, and teacher interns are encouraged to become aware of their own conceptualization of the reading process. This awareness enables them to see the effect of their own conceptualization of reading on their individual teaching behavior.

What teachers do is affected by what they think (Clark, 1978). Knowledge and belief systems are important factors that influence behavior. These systems provide a framework for interpreting experiences and planning actions. More specifically, when considering reading related teaching behaviors, it is the knowledge and background experiences that teachers bring to the reading situation that influence their planning and interactions with learners. These interactions are not random events but are the result of decisions teachers make continuously as they monitor the learning situation. This process of decision-making can be thought of as the implementation of the teacher's particular conceptualization which can best be described as an internationalized guide to behavior, be it at a conscious or unconscious level.

Harste and Burke (1977) used observational and interview data to examine three theoretical orientations toward reading. They operationally defined a theoretical orientation as a particular knowledge and belief system held toward reading which operates to establish expectancies and strongly influences decisions made by teachers and pupils. Harste and Burke defined these orientations as a) a sound/symbol or decoding orientation, b) a skills orientation in which the focus is on the word level, and c) a total language or language based approach. Their research indicated that both teachers and learners have distinctive and identifiable internal models of reading and that their interpretations of these models affect teacher-pupil interactions significantly during reading instruction.

There is further support for these findings in the recent descriptive work of Mitchell (1978). She examined the practices of teachers as they responded to the oral reading errors of students. The teachers were trained in two different views of the reading process, namely Goodman's psycholinguistic framework (1976) and Gattegno's *Subordination of Teaching to Learning* framework (1976) and were considered expert respresentatives of each of these approaches to teaching reading. Teacher-student interactions were videotaped and analysis indicated that the teachers' practices were related to the model of reading and learning emphasized during their training.

This current research by Harste and Burke, and Mitchell which focuses on the relationship of teachers' theoretical perspectives to instructional practices using written discourse is an extension of earlier work (Barr, 1975; Cohen, 1975) studying patterns or student response at the word level. Barr studied the strategies that first-grade children used to recognize words in isolation. Her results indicated that it is possible to determine the strategies that beginning readers use for identifying individual words and that these strategies are influenced significantly by the class instruction. Cohen's work also focused on first-graders as they learned to read by a phonic approach. Her analysis of their oral reading errors over an eight month period indicated that the beginning readers use the operations taught within a reading method. It would appear that a learner's approach to the reading task is influenced by instruction and that teachers use their internalized concepts of the reading process as a guide to that instruction.

Interns' Views of the Reading Process

Our experience as teacher educators indicates that interns' behavior tends to reflect models which are linear in character and which more frequently start with decoding rather than meaning construction. They view the components of the reading process — phonics, structural analysis, comprehension and study skills — as unintegrated, discrete and sequential components.

Linear models not only stress a particular directional flow of information from print to reader (data driven or bottom-up) or from reader to print (conceptually driven or top-down), but also the nature of the linguistic units at each level of processing (graphic, phonemic, morphemic, syntactic, semantic, conceptual). In bottom-up models (see Gough, 1972 and La Berge & Samuels, 1974) the reader begins by attending to the print, an image of which is briefly stored in a visual senosry memory. Next, the information from the image is recoded phonemically and stored in short term memory. Then it is recoded again semantically and passed on to long term memory for interpretation and storage. The emphasis in these models is on a sequential progression from graphic to phonemic to syntactic to semantic and finally to conceptual information. In top-down models (see Goodman, 1976; and Smith, 1971) the reader begins with a conceptual prediction of meaning based on the reader's prior knowledge and the available context. Through the selection of semantic, syntactic, morphemic, and phonemic cues in the text, the prediction is either confirmed or negated. If the prediction is not confirmed, a new one must be formulated based on the available store of information in long term memory and the information just gleaned from the text. The major emphasis is the utlization of prior knowledge by the reader to formulate meaning hypotheses.

The interns' conceptualization of reading as a linear process is reflected in their diagnostic and teaching decisions. From a bottom-up perspective, diagnosis is viewed as assessment of discrete skills. The instruction that follows is designed to teach deficient skills. From a top-down perspective, diagnosis is viewed as assessment of the prior knowledge and language of the reader and the extent to which the reader can utilize these resources when reading continuous discourse. Instruction is based on helping the reader utilize background knowledge to make predictions while reading.

Applying Knowledge to a Case Study: Top-down and Bottom-up Models

To illustrate how interns' conceptualization of reading affects the diagnosis of readers and the planning of reading strategies, data from one case study, Raymond, will be examined from both a bottom-up and a top-down perspective. Raymond, an eleven year old sixth grader, scored at the 2.6 grade level on all reading related subtests of the *Stanford Achievement Test*, except on the Vocabulary subtest on which he scored 6.9. On an Informal Reading Inventory his instructional level was set at the second grade level. After reading a story from a second grade reader, he scored 72% on recall, yet his word recognition was not very accurate. Raymond seemed to use the beginnings and endings or just the beginnings of words to guess words presented in isolation (see Table 1, items 1-9). He also had a tendency to confuse b's and d's and reverse letters on words in isolation (see Table 1, items 10-14). He had great difficulty with multisyllabic and multimorphemic words (see Table 1, items 15-17). Even when he was able to recognize syllables, he would miss the word due to his incorrect pronunciation of one or more parts and his

TABLE 1

Isolated Words Read by Raymond

Reader	**Text**	**Reader**	**Text**
1. dark	drink	10. big	dog
2. children	chicken	11. $belosin	delicious
3. small	shall	12. not	on
4. site	sit	13. was	saw
5. rain	ran	14. how	who
6. cot	coat	15. $uppaints	appearance
7. mice	myself	16. $subnel	suddenly
8. broth	brother	17. $vaint	vacant
9. above	about	18. staton	station

($ indicates a non-word)

TABLE 2

Words in Context Read by Raymond

Reader	**Text**	**Correction**		
		Y	A	N
1. Once there were a	Once there was a	x		
2. The jumped up	He jumped up	x		
3. The big of silver	The bag of silver	x		
4. He would not ever He would not even grow – 1 He wouldn't even growl	He won't even growl		x	
5. We'll. Clarence might not be	Well, Clarence may not be		x	
6. under his fish one shoulder and the other shoulder	untie first one shoelace and then the other shoelace			x
7. while down into	Whales do not			x
8. we heard a tribal cross	We heard a terrible crash			x

inability to blend the parts together (see Tabe 1, items 18 and 19). When reading continuous discourse, Raymond recognized words and then missed the same words later in the passage. His use of correction strategies was erratic. Usually he corrected himself until some degree of semantic acceptability existed. This resulted in either a total correction (see Table 2, items 1-3) or an attempted one (see Table 2, items 4 and 5). Less frequently he read words as if they were on a word list, making little attempt to utilize his syntactic or semantic knowlege (see Table 2, items 6-8).

Interns who view reading from a bottom-up perspective would consider Raymond as inadequate in his use of word attack strategies. His remedial instruction would emphasize phonic analysis and morphemic analysis. Strategy lessons in phonic analysis, particularly medial vowels, diphthongs, consonant blends and digraphs, as well as lessons in specific syllabication generalization and morphemic elements would be stressed. The assumption is that by improving word recognition skills, comprehension would improve.

On the other hand, interns who view reading from a top-down perspective would consider Raymond as a reader who is using background knowledge quite effectively when reading this type of material. However, lessons would probably focus on making sure he uses correction strategies consistently. Strategy lessons based on recurring names and terms might be designed, since he has difficulty remembering names and words once pronounced correctly. To overcome habitual associations of *we'll* and *well* and *then* and *when,* texts would be constructed constraining the use of each term. Eventually these texts would be phased out for texts using both members of the pairs. Most important of all, materials requiring more accurate reading such as: directions, recipes, science experiments, might be used to help Raymond begin to attend more closely to the text. Comprehension questions might also be utilized to focus Raymond's attention to the details in the text. The assumption here is that by comprehending different kinds of materials, word recognition skills will improve.

Limitations of the Dichotomy

Both bottom-up and top-down models of the reading process have limitations since they do not stress a flexible and integrated use of all knowledge sources available to the reader as text is processed. Bottom-up models stress word accuracy and do not adequately account for the influence of prior knowledge and higher level processes on word recognition as well as the interpretation of text. Top-down models rely heavily on prior knowledge and language facility of the reader and do not emphasize the importance of processing intra-word cues. Interns become aware of the limitations of linear models through discussions which create dissonance with their conceptualization of reading. It is at this point that interns are ready to understand a viable alternative to linear models of reading which is an interactive model (see Rumelhart, 1976). Interactive models posit the flexible use of both conceptually driven and data driven processes, as the reader constructs meaning from the text. Linguistic units are used as needed, not in a particular sequence. Such a model stresses the interdependency of the reader's perceptual, memory, and cognitive abilities as well as the requirements of the reading task and text. It incorporates many of the concepts involved in both top-down and bottom-up models and provides new meanings for integrating processes described in both of these models. From readers' point of view, the phonemic, lexical, syntactic, and semantic features are abstracted as they are needed. As each set of features is processed, there is an effective difference in the perception of the remaining features. For example, phonemic features are perceived as they relate to the lexical, syntactic, and semantic features. Or, syntactic features are organized from lexical, phonemic, and semantic information. To accomplish this demanding act, a flexible memory shift between long term and short term memory is theorized. Short term memory holds items of information just until they are organized into schemata or information chunks in long term memory. These information chunks are formulated according to rules which describe language and concept systems. Language rules, such as grammars, and concept rules, such as categories, are part of these systems. As readers read, their store of knowledge and ability to use appropriate rules as needed change. In addition, affective factors such goals, values, and interest interact with the reader's application of prior knowledge and rules as they process different types of texts.

During the early stages of reading, interactions occur at several levels. Novice readers add to their store of rule-governed behavior in long term memory from oral language as well as from their reading experiences. This added information in memory enables the learner to interact with the text in new ways. These new sources of knowledge change the learner's perceptions of phonemic, lexical, syntactic, and semantic features.

The Interactive Model

From the interactive point of view, diagnosis of readers in trouble implies observing the dynamics of the reading act and analyzing reader's use of their prior knowledge of phonemic, syntactic, and semantic systems in constructing meaning from the text. Successful observation and analysis necessitates an assessment of readers' language and prior knowledge. Discrete components relating to each of the cueing systems are analyzed in depth where readers show gaps in their repertoires of strategies. As part of this diagnostic process, teachers analyze the characteristics of text and the knowledge required to process it so that an interpretation of reader/text interaction can be made. Instruction is designed to help learners understand the relation of new information with information already stored in long term memory.

From an interactive perspective all of the diagnostic information previously described has relevance, but the information must be integrated and restructured. Raymond relies heavily on his use of prior knowledge and language ability during reading as the feedback he needs from integrating grapho-/phonic features is frequently lacking. In Raymond's case, this leads to inefficient processing of text when the text becomes difficult.

Raymond's interest in science and ancient history provides excellent content for word study. The affixes and syllabication of these content words could be taught as Raymond is aided in developing science and history concepts. A modified language experience approach in which Raymond would write an on-going account of what he is studying in science and history would also provide reinforcement. Though Raymond would profit from short lessons in phonics, particularly on medial vowels, and in structural analysis, these lessons must include contextual applications of the elements taught. The words used in these lessons should be drawn from his speaking/listening lexicons and the contextual application should emphasize comprehension of elements taught in context. Composing simple poetry built on phonograms would be good reinforcement of sound/symbol correspondences. Maze exercises, or multiple choice cloze, which offer choices with similar configurations and function will draw upon Raymond's quest for meaning and help him attend to the orthographic features of words.

Raymond's case is one of fifteen or more that graduate interns study during a year's course in diagnosis and remediation. During this course, interns assemble clinical information on children and observe them working with a variety of materials. The interns are encouraged by the faculty to make hypotheses relevant to the pupils' problems in reading based on case study data and to assist pupils to develop a variety of strategies for approaching the reading task. As a result of teacher educator/intern interactions, the nature of these hypotheses and teaching strategies gradually change to indicate a new awareness of the reading process as an interactive one.

The development of this model of teacher education has progressed over a two-year period during which time we, teacher educators, have restructured our teaching practices in the college laboratory. We have learned a great deal about how our student interns learn and how we can help them learn. These interns have consciously experienced learning and have related the processes to their teaching. The shared experience has created an open, questioning environment in which teacher educators, interns, and pupils are free to question views which are discordant with their own views and to restructure their knowledge to incorporate new information.

Our hope is that our interns will enter the teaching profession knowing that learning is facilitated by meaningful interaction, confident that they can foster interaction in their classrooms and in their schools, and receptive to reconstruction of meaning as new research on learning and reading is forthcoming.

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READING INSERVICE NEEDS ASSESSMENT: INSTRUMENTATION AND ANALYSIS

Success or failure of a reading inservice program depends largely upon the commitment of participants to the goals and objectives of the program. Commitment, in turn, is contingent upon the degree of staff involvement in the initial planning stages of the program. One effective way of involving staff is through the use of a needs assessment survey allowing teachers to identify areas in which they want further training. Data from such surveys can be used for systematic planning and implementation by providing opportunities for discrepancy approaches such as those described by Marrs and Helge, 1978; Gale, 1977; Mangieri and McWilliams, 1976; and Ingersoll, 1976. Additionally, such data can be factor analyzed for more exact identification and examination of needs. Such is the procedure followed in the study reported here.

METHOD

Instrument

A needs assessment instrument developed and reported by Allen and Chester (1968) was used to gather data for the study. Teachers were asked to rate 21 items (14 teaching techniques and 7 skill development areas) in three ways, indicating (1) how important they considered the item, (2) how frequently they were presently using the technique or instructing in the skill areas described in each item, and (3) how they saw each item as a personal need (Priority of Need Subscale) in terms of an inservice program in reading. Responses in the Priority of Need Subscale were on a five-point Likert-type scale ranging from (1) "high priority" to (5) "of no importance." When the 21 items (teaching techniques and skill development areas) were rated according to priority of personal need, an internal consistency reliability coefficient of .92 was estimated (Cronbach's Alpha) for the Priority of Need Subscale. The first 14 items in the subscale were grouped in a section labeled Techniques and strategies, and the remaining seven items followed in a Skill Development section. Descriptive data were also collected including years of teaching experience, grade level of teaching, and subject area specialty so that responses could be tabulated by specific subgroups across school districts.

Sample

Teachers from three school districts in British Columbia completed the survey. Respondents included 618 teachers from the Prince George District, 216 teachers from the Abbotsford District, and 202 teachers from the Powell River District. A total of 1036 teachers participated in the study, of which 739 were teaching at the elementary level, 159 were junior secondary teachers, and 138 were teaching in secondary schools. Schools in rural, urban, and suburban areas were represented.

ANALYSIS

Responses to the 21 items along the Priority of Need Subscale were submitted to factor analysis to identify clusters of topics to be grouped when designing reading inservice programs. The principal component factoring method was used, and Varimax rotation was employed (Harmon, 1970). Four factors were identified and labeled as follows:

1. Content Area Reading
2. Individualizing Instruction
3. Reading Skills
4. Reading Materials

Table 1 lists the items contained in each factor and mean priority ratings assigned by groups of teachers at three teaching levels.

TABLE 1

Items within Factors and Mean Priority Ratings by Teaching Level

	Means			
Items	**Elem.**	**Jr. Sec.**	**Sr. Sec.**	**F Ratio**
Factor 1: Content Area Reading				
Questioning Techniques	2.39	2.41	2.37	.07
Subject Skills	2.58	2.58	2.45	.87
Critical Reading	2.02	2.24	2.34	7.47[1]
Study Skills	2.21	2.15	2.04	1.63
Research Skills	2.36	2.39	2.31	.23
Factor 2: Individualizing Instruction				
Informal Assessment	2.21	2.63	2.43	12.66[1]
Interests and Attitudes	2.39	2.64	2.75	9.00[1]
Disabled Readers	1.65	2.12	2.27	30.20[1]
Superior Students	1.74	2.34	2.32	38.15[1]
Divergent Interests	2.31	2.48	2.36	2.09
Individualizing Instruction	1.95	2.40	2.32	17.74[1]
Motivational Strategies	1.99	2.03	1.95	.23
Factor 3: Reading Skills				
Vocabulary Skills	1.65	2.08	2.23	29.88[1]
Comprehension	1.54	1.94	1.92	18.83[1]
Word Recognition	1.87	2.46	2.44	32.79[1]
Factor 4: Reading Materials				
Determining Reading Level of Materials	2.14	2.30	2.14	1.30
Selection of Instructional Materials	1.82	1.95	1.95	1.46
Selection of Supplementary Materials	2.05	2.27	2.34	6.76[2]
Items with Ambiguous Patterns				
Use of Standardized Tests	2.73	2.91	2.96	3.59[3]
Reading Objectives	2.19	2.74	2.77	28.73[1]
Rate and Flexibility	2.41	2.82	2.77	14.33[1]

^1p .001
^2p .01
^3p .05

Three items, relating to the areas of standardized reading tests, reading objectives, and rate and flexibility, were not assigned to any of the four identified clusters. This was because they tended to load approximately equally on two or three factors, and their loadings were all low. In addition, there appeared to be a lack of demand for training in these areas as reflected by lower mean ratings.

RESULTS AND DISCUSSIONS

Further inspection of items within each factor revealed that factors 2 and 4 both consist entirely of items classified as Techniques and Strategies. Factor 3 contains three basic Skill Development items. Factor 1, Content Area Reading, accounted for the largest proportion of common variance (38.1%), and includes a combination of Technique/Strategy and Skill items. Demand for training in Content Area Reading was greatest for the senior secondary teachers; secondary teachers placed proportionately less importance upon areas included in the remaining three factors. Teachers at all levels placed highest priorities on factor 3, Reading Skills (vocabularly skills, comprehension, and word recognition).

Visual inspection of means for the three teaching level groups indicates that elementary teachers generally perceived a greater need for inservice training in most of the areas listed. Analysis of variance with Scheffé tests for multiple comparisons of group means identified significant differences between teaching levels for 13 of the 21 items (see Table 1).

As the factor analysis indicates four factors might be used to organize topics for inservice in reading. Items within each of these four components could be developed into separate training modules. Allowing the mean priority to serve as the determinant for both sequencing of topics and time allocations. Correlations of these results with teacher characteristics indicated that it would be most effective to group teachers according to teaching level. Although it would be possible to combine junior secondary and senior secondary teachers for training programs, elementary teachers rank the topics substantially different and inservice should be uniquely designed for teachers at that level.

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THE RELATIONSHIP BETWEEN TEACHER-STUDENT INTERACTION AND STUDENTS' READING COMPREHENSION

To present, reading researchers have attempted to describe comprehension in terms of three types of meaning: *referential, logical inference,* and *pragmatic inference.* Referential meaning is the meaning which is literally conveyed by the words in a text. Readers who understand the referential meaning of text are said to 'reproduce' the text (Spiro, 1977). Logical inference is the meaning which a reader implicitly draws from the referential meaning of a text (Thorndyke, 1976). For example, given the statements, *John walked into the room and the chandelier was beautiful,* a reader may make the logical inference that the chandelier was in the room John entered. Readers who make logical inferences while reading a text are said to 'reconstruct' it (Spiro, 1977). Pragmatic inference is the meaning which represents the experiential knowledge a person brings to understand a given text. This type of meaning has been described as world knowledge (Ackerman, 1978), schema (Anderson, 1977), or context knowledge (Grice, 1975; Stalnaker, 1974). Pragmatic inference meaning is illustrated by the statement, *Because the seam split, the notes were sour.* The statement is meaningful only if the reader has the pragmatic knowledge of how bagpipes operate. Readers who make pragmatic inferences while reading a text are said to 'embellish' it (Schank & Abelson, 1977).

For the most part, these three types of meaning have been assumed to comprise the universe of comprehension. However, the work of Allington (1978), Barr (1975), and Spiro (1977) suggests that reading comprehension also consists of a fourth type of meaning — namely, *social meaning.* Social meaning refers to the fact that reading is an activity which often represents a unit of teacher-student behaviors that recurs in the space and time of a classroom (Gump, 1969). Moreover, reading represents a task comprised of a goal and a set of operations necessary to reach this goal (Doyle, 1978). How students interpret and attempt to achieve a particular goal during the activity of reading comprises the social meaning of reading comprehension.

The question remains as to how social meaning interacts with referential meaning, logical inference, and pragmatic inference. In other words, how does social meaning influence whether and how a student reproduces, reconstructs, or embellishes a text? The work of Spiro (1977) suggests that social meaning interacts with the other types of meaning in the following way. When students interpret the purpose of a particular reading task as one in which they are to meet the goal, or expectation, of a teacher or experimenter, they will reproduce the text. This preserves the structural or literal integrity of the text, thereby minimizing what they believe may be considered by the teacher or experimenter to be frivolous or false. On the other hand, when students interpret the purpose of a particular reading task as one in which they are to establish their own goals of reading, i.e. for updating their present knowledge, they will reconstruct and embellish text. In such instances, new knowledge is added and restructured to fit old knowledge.

If Spiro's (1977) observations are correct, one might hypothesize that how students will interpret text depends upon how students comprehend social meaning, in general, and interact with their teachers, in particular. One might hypothesize that in situations where teacher-student interaction patterns are such that the student always attempts to comply with the teacher's goals, the student will tend to reproduce text maximally and reconstruct or embellish text minimally. On the other hand, where teacher-student interaction patterns are such that the student always attempts to determine his or her own goals for reading, the student may maximize reconstruction or embellishment and may minimize reproduction of text.

The tenability of the preceding hypotheses depends, in part, on the validity of the assumption that students and teachers engage in different interaction patterns. If it is the case that all teachers consistently adopt the same interaction pattern with their students, such that either the teacher dictates the goal of a reading lesson or students themselves determine the goal, then there should be no differences in the manner in which children choose to assign meaning to text. On the other hand, if it is the case that teachers interact differently with students, in some cases the teacher defines the goal, in other cases students define the goal, then there should be significant differences in how children choose to interpret text. Moreover, the more consistent the teacher is in dictating or allowing a student to determine goals, the more consistently a student should assign a particular meaning to text.

That teachers do, in fact, differ in their interaction patterns with students has been well documented. For example, in an ethnographic study of one classroom, McDermott (1976) observed that the teacher's patterns of interaction changed depending on the reading group she was instructing, with the variations working to the advantage of the good readers. Allington (1978) found that teachers were more likely to interrupt and correct poor readers than good readers during oral reading activities. Other ethnographers (Cicourel, Jennings, Jennings, Leiter, MacKay, Mehan, & Roth, 1974; McDermott, 1977; Mehan, 1978; Mehan & Wood, 1975) and investigators of classroom processes (Archer, 1977; Brophy & Good, 1970; Fiedler, 1975; Cohen, 1978) have noted that teachers' behaviors differentially effect their students' achievement outcomes.

One problem with the preceding experiments is that the test instruments and/or the observation procedures used for describing student outcome behaviors were insensitive to the types of meaning students specifically assigned to a text. Given the assumption that teachers interact differently with students, since teacher-student task structures differ, the purpose of the present study was to determine the extent to which different teacher-student interaction patterns influence the manner in which students choose to assign a particular type of meaning to text. The specific hypotheses which were tested were: (1) If the teacher-student interaction is such that a student consistently complies with the designated goals of the teacher, this student would most likely assign a referential meaning to text, thereby reproducing text. (2) If the teacher-student interaction is such that a student consistently initiates his or her own goals *relative* to the activity of the reading task, this student would most likely assign a logical inference meaning to text, thereby reconstructing it. (3) Finally, if the teacher-student interaction is such that a student consistently initiates his or her own goals *independent of* the activity of the reading task, this student would most likely assign a pramatic inference meaning to text, thereby embellishing text.

METHOD

Subjects

Twenty-eight students from one fourth grade class participated in the study. The class was located in a small suburban school district in upstate New York. The teacher had grouped the children into three reading groups according to their reading achievement test scores as determined by the *Metropolitan Reading Achievement Test.*

Procedure

Six observations of teacher-student interaction patterns were made for each of the three reading groups over a four week period. The teacher met with each group for approximately 20 minutes each morning. In addition, two observations of each group were conducted prior to data collection to reduce the possibility of observer effects on teacher and student behaviors. During the observation periods, the teacher conducted the reading lessons according to her normal routine. On the seventh scheduled observation, the teacher administered a comprehension test as the scheduled reading activity for each group. She informed the students that they were doing a comprehension exercise as usual and that, in addition to answering questions about the reading material, they were to write as much as they could remember about each story. Students were instructed to read each story once and not to refer back to it when writing their recall. The students were given approximately 20 minutes to complete the assignment. They were informed that their responses would not be graded, but would be checked in the usual fashion.

Classication of Students' Social Meaning

How students complied with the teacher's goals or determined their own goals, be they consistent or inconsistent with the reading activity, was assessed using a modification of the Hit-Steer Observation System (Fiedler, 1975). The observation system was designed to measure the extent to which teachers and students determine the goals of class activities by assessing the manner in which students and teachers influence one another. A verbal initiation, or influence attempt, requesting compliance is called a 'hit.' Compliance with a hit is called a 'steer.'

In the modified system, student behaviors were classified as either: (1) *steers,* (2) *on-task hits,* or (3) *off-task hits. Steers* were scored when the teacher initiated a request, e.g., asked a question or gave a command, and the student complied with this request. In this instance, it was assumed that the student was complying with the goal requested by the teacher. *Hits* were scored when students either made a request of the teacher or offered information not directly asked for by the teacher. *On-task hits* were scored when the pupils' request or offer of information related directly to the general *theme* of the reading activity. Reading activity themes included such things as discussing the meaning of a passage read, activities opening and closing the lesson, and vocabulary exercises. *Off-task hits* were scored when the pupils' requests deviated from the general theme of the reading activity. Such hits usually involved students offering information which had nothing to do with the discussion of a particular reading passage being considered by the reading group.

To classify students as *Task Compliant, On-Task Initators,* or *Off-Task Initiators,* the number of steers, on-task hits, and off-task hits recorded for each student during the observation periods was first determined. The sum of these three scores was then used to compute three percentages for each student. If the highest percentage of verbal behaviors observed were steers, students were classified as Compliant. If the highest percentage of verbal behaviors were on-task hits, students were classified as On-Task initiators. If the highest percentage of verbal behaviors were off-task hits, students were classified as Off-Task Initiators. Fifteen students were Task Compliant (mean C. A.=10.1 yrs.) 6 were On-Task Initiators (mean C. A.=9.7 yrs.); and 7 were Off-Task Initiators (mean C. A.=9.7 yrs.).

Materials

Three prose passages were adapted from Ackerman (1978) (see Table 1 for an example). The paragraphs were modified so that each contained an equal number of propositions (Kintsch, 1974). Also, care was taken to control for word frequency and imagery across paragraphs. Given the two types of paragraphs used in Ackerman's (1977) study, the first variant interpretation was selected so that each had a positive pragmatic truth interpretation. Each paragraph had one sentence containing logical inference information and one sentence carrying pragmatic inference information. The sentences with logical presuppositions used three factive verbs, *realize, regret,* and *be surprised;* the implicative verb, *remember;* and two inception-termination verbs, *continue* and *finish.* The purpose of using these paragraphs was to balance the number of referential, logical inference, and pragmatic inference statements across paragraphs.

TABLE 1

Sample Prose Passage Used in the Comprehension Task

It was early one morning, before school, and Bill was in bed thinking. Soon his mother came to his room and said, "It's seven o'clock, Bill." When Bill was washed and dressed, he thought about his brand new red jacket, which he had torn and ruined yesterday. He felt very badly, and was afraid to tell his mother. Bill came downstairs and sat down. His mother came in and asked where his new jacket was. Bill said, "I just discovered I left it at school. Bill did not continue to shine his shoes, but went to get his books.

Scoring of Comprehension Materials

Students' written recall were first divided into propositions (following Kintsch, 1974). Propositions were then classified as being either *referential, logical inference,* or *pragmatic inference.* Referential propositions were those which had either a literal or synonymous representation in the text base. Logical inference propositions were those that were implicit in the text base but not directly represented. Pragmatic inference propositions were those which had no explicit representation in the text base nor were they propositions which could be inferred from the text base. This yielded three scores and a total number of propositions for each student. To control for the length of each student's written protocols, a percentage was calculated for each type of comprehension. Students' responses were categorized into three groups (referential, logical inference, pragmatic inference) based upon the predominant proposition type used by each.

RESULTS

The data were first examined for differences in social meaning structure and propositional comprehension type as a function of reading group ability. No differences were found.

A chi square was then computed using the three social meaning groups and the three types of linguistic meaning predominantly used. The chi square was highly significant ($X^2_{(4)} = 39.26, p < .01$) indicating that the social meaning observed for students during reading group activities related to how students selected linguistic meaning to comprehend text. Compliant students comprehended using predominantly referential propositions. On-Task initiators comprehended using predominantly logical inferences. Off-Task Initiators comprehended using mostly pragmatic inferences.

Analyses of variance were then computed to test the three specific hypotheses. The three observation classification groups served as the independent variables for the analyses using each of the three types of comprehension scores as dependent variables. Table 2 presents the mean proportion of referential inferences, logical inferences, and pragmatic inferences made by students who were classified as Task Compliant, On-Task Initiators, or Off-Task Initiators. For ease in communication, the data in the table are expressed in percentages although the statistical analyses were conducted using arc sin transformations, since percentages are not normally distributed.

TABLE 2

Mean Proportion of Types of Inferences Made During Comprehension Task For Students According to Their Situated Meaning

Social Meaning	**Linguistic Meaning Type**		
	Referential	**Logical Inference**	**Pragmatic Inference**
Task Compliant	83.24%	11.95%	4.50%
On-Task Initiators	43.95%	50.95%	5.10%
Off-Task Initiators	38.26%	10.49%	51.25%

The analyses of the data confirm each hypothesis. Task Compliant students used a significantly higher proportion of referential statements when instructed to recall paragraphs than did Initiators, $F(2, 25) = 27.24, p < .001$. Students who initiated on-task, or reading related, interactions with their teacher used a significantly higher proportion of logical inference statements during recall than did Task-Compliant students or Off-Task Initiators, $F(2, 25) = 15.05, p < .001$. Off-Task Initiators used a significantly higher proportion of pragmatic inferences than did the other two groups of students, $F(2, 25) = 44.41, p < .001$. In each analysis, Scheffé comparisons between the three groups indicated that the group of students hypothesized to be highest on each of the three comprehension types was significantly higher than the remaining two groups.

DISCUSSION

The results support the hypothesis that how students interpret text meaning is, in part, a function of how students interpret social meaning. Social meaning, in this study, was defined as how students interpreted their interactions with a teacher. Students who readily complied with the teachers' requests were assumed to represent those students who viewed the goal of a reading task as being teacher defined. It was found that these students most often reproduced text, recalling text using predominantly referential meaning. Students who initiated behaviors relative to the general task of the reading activity were assumed to represent those students who viewed the goal of a reading task as being student defined. It was found that those students most often reconstructed text, recalling text using predominantly logical inference meaning. Finally, students who initiated behaviors which departed from the general theme of a reading activity were assumed to represent those students who viewed the reading lesson as an opportunity to define their own goals and activity as well.

The basic limitation of this study, of course, is the fact that it was conducted using only one classroom. In this regard, the question of teacher and classroom effects remain undermined. It may be the case that not all teachers interact as consistently with students. Moreover, it may be that some teachers are either so autocratic or liberal that all students will view the goal of a reading task as, respectively, teacher defined or student defined and will respond accordingly.

However, despite these limitations, the study raises several significant issues which need to be considered by reading researchers and practitioners alike. For the most part, reading researchers and practitioners have focused exclusively on text meanings and have overlooked social meaning. Up to this point, reading ability has been generally assumed to be synonymous with visual linguistic ability. But, as this study points out, the quality of comprehension is not simply a function of linguistic ability — it is a function of one's ability to understand social meaning as well. Perhaps rather than explaining reading in terms of psycholinguistic models, reading researchers must begin explaining reading in terms of psychosocial linguistic models. Teachers who have been quick to blame students' poor reading performance on linguistic inability may perhaps do well to examine the manner in which they interact with such students. In short, reading researchers need to consider a shift in focus from the examination of linguistic competence to the examination of communicative competence (Hymes, 1972) if the text and context of reading are ever to be adequately understood.

ACKNOWLEDGEMENTS

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MALE AND FEMALE COLLEGE-AGE READERS' AFFECTIVE RESPONSE TO FORMAL, COLLOQUIAL, AND SUBSTANDARD DIALOGUE OF MALE AND FEMALE LITERARY CHARACTERS

Previous research (Dulin & Greenewald, 1976; Greenewald & Dulin, 1977; Dymond, 1977) has shown that mature readers' affective response to literary characters varies according to the character's regional dialect or level of language. Generally speaking, it appears that literary characters who speak in other than "standard" (formal or colloquial) ways are usually judged to be less intelligent and less cultured, though not any less warm, friendly, or likeable, than are the same characters when speaking at standard levels of language.

Research findings of certain sociolinguists (Labov, 1966; Shuy, 1969) suggest, however, that sex differences, both in terms of the sex of the literary characters involved and in terms of the sex of the readers doing the judging, may be operative, with (a) male readers being more "tolerant" of less-than-standard speech and (b) with male literacy characters more *tolerated* when speaking in a less-than-standard way.

This study was an attempt at investigating this possibility. A series of literary characters were created and presented to both male and female readers in both "male" and "female" versions containing three levels of language, and the judgments of those male and female readers were then compared statistically.

PROCEDURES

The first procedural step taken was the selection of six short character-sketches deemed suitable for adaptation into a set of data-collecting instruments appropriate for the purposes of the study. Out of nine male-character selections used in a previous study of a similar nature, six were chosen as (a) well-laced with dialogue which could be manipulated to portray the three levels of language to be compared, (b) representative of a variety of personalities and settings, and (c) of a nature such that they could all fairly easily be converted into credible matching male-character and female-character versions.

Once re-written into six versions each (male and female formal-level dialogue, male and female colloquial-level dialogue, and male and female substandard-level dialogue versions) these 36 articles were arranged into six parallel forms of a final set of data-collecting instruments, each form of which now contained one version each of the six original personality-sketches, rolled in order in such a way that each sketch appeared in one form as first, in another form as second, and so on. Examples of the three language-level variations carried out would be from a construction like "would have" to "would've" to "would of" or from a construction like "is not" to "isn't" to "ain't." The identifying of each version as either male or female was achieved through the alternating of male and female first names for the major characters and the alternating of male or female personal and possessive pronouns from version to version.

Following each article were five, five-step semantic-differential scales, with the polar adjectives WARM-COLD, FRIENDLY-UNFRIENDLY, LIKEABLE-UNLIKEABLE, INTELLIGENT-UNINTELLIGENT, and CULTURED-UNCULTURED posed at their left and right ends.

These instruments, then, stacked in alternating order form-by-form, were distributed randomly to 104 college-age subjects enrolled in Reading Methods courses at the University of Wisconsin-Madison and the University of Wisconsin-La Crosse, and these subjects were asked (a) to read each set of articles one at a time, (b) to form as best they could "mental images" of the characters presented, and finally (c) to respond to the five scales associated with each version in terms of those mental images. Later informal discussion with the subjects indicated that the instructions were clearly understood and fully complied with.

Next, each instrument was hand-scored and the resulting data punched onto IBM cards. Each scale-response was scored on a 5, 4, 3, 2, 1 basis from left to right (from the "positive" adjective to the "negative" one) and three additional variables were created: (a) a "personality-related" summation consisting of a sum of each subject's responses to the first three scales, (b) an "education-related" summation consisting of a sum of each subject's responses to the latter two scales, and (c) a "total response" summation consisting of a sum of each subject's responses to all five scales. In addition, each subject's sex was recorded, and note was taken of which form of the instrument he or she had received.

ANALYSIS

A series of three-way analyses of variance was performed, with sex of subject, sex of character, and language-level of version treated as main effects and the subjects' responses to each of the five scales (plus the three additional "summation" variables) treated as dependent variables.

The only consistent pattern of main-effect difference found was the same one present in the results of the earlier related studies, that of subjects' responses to the two "education-related" scales (INTELLIGENT-UNINTELLIGENT and CULTURED-UNCULTURED) varying systematically in terms of the language-levels of the various versions. No interaction effects were found.

SUMMARY AND CONCLUSIONS

In sum, then, the following conclusions were reached:

(1) As we found in earlier studies, the language-levels in the dialogue of the story-characters *did* lower significantly the INTELLIGENCE and CULTURE ratings of the main characters in every selection but did not change the ratings these characters received in their WARM-COLD, FRIENDLY-UNFRIENDLY, and LIKEABLE-UNLIKEABLE scales.

(2) Neither sex of subject nor sex of story-character, however, were related

258

significantly to either (a) the ratings the characters received, or (b) the levels of difference found to be in evidence when these ratings were compared.

(3) Overall, then, the results of this study simply confirm those found in earlier studies; that is, that readers tend to judge literary characters who speak in substandard language as lower in intelligence and in culture than they do the very same characters when they speak in "standard" (either formal or colloquial) language, but do not judge such substandard-speaking characters as any less warm, friendly, or likeable.

As for extending our knowledge of this phenomenon into any of the sort of sex-of-reader or sex-of-literary-character interrelationships suggested by sociolinguistic theorists, then, the study *does not* lend any support; either those relationships do not exist, or else the instrumentation used was simply not sensitive enough to detect them at the levels at which they do exist.

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ELEMENTARY READERS' INFERENCES OF AND PREFERENCES FOR CHARACTERISTICS OF PROTAGONISTS IN STORIES

Recent emphasis on sexist educational materials in literature related to reading theory and curriculum has centered on critics' castigation of authors for characters portrayed in stereotyped sex roles. Kingston and Lovelace (1978), in a critical review of the literature on sexism and reading, noted the naive and unsophisticated nature of much of the research, and suggested that more evidence of the impact, if any, of alleged sexism be obtained before wholesale rewriting of textbooks is begun.

Investigators in this area have failed to consider research in the psychology of sex roles which suggests that a reader's sex role stereotypic schemata may affect prose comprehension. Sex roles stereotypic schemata refer to those organized rules self-perceived and deliberately taught; these rules may sometimes be a distortion of reality — oversimplified, exaggerated, and stereotyped. Like most childish rule indications, sex role stereotypic schemata do not easily recognize exceptions (Maccoby and Jacklin, 1974). Kohlberg (1966) delineates a cognitive-developmental model for the acquisition of sex role stereotypic schemata, noting that a child gradually develops concepts of "masculinity" and "femininity"; once sex typing occurs, as early as four years of age (Sears, Rau, and Alpert, 1965), the child attempts to match his behavior to his conceptions. Kohlberg suggests that the child undergoes reasonably orderly age-related changes in the subtlety of his thought about sex typing; consequently, his actions in adopting sex-typed behavior, and in reacting to sex role stereotypes, change in ways parallel to conceptual growth.

The measurement of the development of sex role stereotypic schemata might be accomplished through examination of children's responses to stereotyped/nonstereotyped protagonists in prose selections. Can children identify the sex of a first-person protagonist fulfilling a clearly-defined sex role? Do children's preferences for such stories change if they discover that a character's gender fails to match the appropriate sex role?

This investigation was designed to investigate elementary students' sex role sterotypic schemata as measured by the relationship of selected variables to elementary readers' inference of and preference for male/female, stereotyped/nonstereotyped first-person protagonists in selected story segments. Hypotheses were formulated to examine effects of sex, reading ability, socioeconomic status, and age on students' reactions to protagonists in prose selections, and to investigate students' preferences for stories when first-person protagonists experienced sex role reversal.

METHOD

Subjects

Subjects (N = 199) selected for inclusion in this study were drawn from a randomly-selected elementary school located in northeastern Georgia in a

260

primarily rural section. The 91 males and 108 females were enrolled in third, fourth, fifth, and sixth grade classrooms. Mean age was 122 months, with mean reading ability, as measured by standardized reading achievement tests, 5.4 (grade level equivalency). All subjects included in the study scored at 4.0 grade level equivalency or above. Raw scores from the *California Achievement Test, Iowa Test of Basic Skills,* and *Stanford Achievement Test* were equated using the Anchor Test Study (Loret, Seder, Bianchini, & Vale, 1974), since standardized reading tests administered varied by grade level. Socioeconomic level (Hollingshead, 1958) ranged from upper to lower class, with mean socioeconomic status being 46.5 (upper lower to lower middle class). The black/white ratio was approximately 85:15.

Materials

Eight 200-word story segments on fourth-grade readability level (Fry, 1968) were written in first-person narrative, each segment containing several embedded sex role stereotypes, since all 13 sex role stereotypes under investigation could not be adequately demonstrated in one single story segment. The sex role stereotypes appearing in the story segments were those most frequently mentioned by authors when referring to stereotyped/nonstereotyped sex roles in educational materials deigned sexist. Sex role stereotypes employed included: abstract-thinking, achievement-oriented, active, agressive, non-conformist, quantitatively-oriented, altruistic, avoidance, emotional, nuturant, passive, verbally-oriented, conformist. Operational definitions of sex role characteristics were based in part on definitions offered by English and English (1958), and in part on usage of terms by various investigators, including Maccoby and Jacklin (1974).

Five jurors (faculty members at the University of Georgia showing expertise in sexism, children's literature, and/or developmental psychology) examined the story segments to insure that embedded sex role stereotypes appeared in the designated story segments; jurors also labeled the 13 sex roles according to gender, in order to ascertain that the sex roles were stereotypic of one particular gender. The jury agreed (100 per cent) that each of the 13 sex roles were indicative of one particular sex; they also agreed the sex role stereotypes were embedded in particular story segments. (Juror agreement of 80 per cent was considered sufficient evidence of the presence of particular sex roles in individual story segments.) Each stereotype appeared in two story segments, one in which the first-person protagonist was sex role stereotyped, one in which the narrator experienced role reversal (nonstereotyped sex role). For example, jurors agreed that four sex role stereotypes appeared in Story Segment 6: altruistic, avoidance, conformist, and emotional. These stereotypes were deemed feminine characteristics by the jurors.

Story Segment 6

> "Race you to the creek!" Jimmy shouted. If we started even I could always beat him; today I drew back just enough to let him win. He was my best friend, and I grinned as we rock-hopped the creek together.
>
> Jimmy nodded toward the other side of the fence. "How about an apple?"
>
> "Not me." I remembered the farmer who guarded his orchard with a shotgun.
>
> "Your're afraid — come on, chicken!" He started over the fence.

> "Chicken and proud of it," I said, trying not to cry. Jimmy was the daring one; I was afraid I'd get caught. Besides, if my parents found out. . . .
>
> Jimmy started across the field, reached the trees, grabbed a couple of apples and started back. I saw the farmer come out of his house carrying a gun.
>
> I shut my eyes and the tears trickled down; I turned and raced back to the creek, waiting for the blast. But the only sound was the thud of Jimmy's feet.
>
> "Come on!" My tears dried as we followed the creek back to the road. I always hated to come away from the creek — one minute you were all secret and far-away feeling, and the next, you were there, back in the world.

A pilot study was conducted with 16 fourth-grade children similar to those participating in the study. The subjects were asked to read each story silently, indicate the sex of the first-person protagonists, and rank the stories in order of preference. Subjects were also asked to write their reason for selecting the sex of each protagonist, in order to determine if subjects were focusing on stereotypes implanted in the stories. The investigator then told the subjects the "correct" sex of each protagonist; subjects then re-ranked stories by preference. Written comments indicated that at least 75 per cent of the students were focusing on sex role stereotypes which jurors indicated appeared in particular story segments. Children's comments, both written and oral, revealed that, in the reality framework of these particular children, boys could be doctors and mechanics, while girls enjoyed reading and were likely to scream and cry.

Procedure

The eight story segments were administered to 199 subjects, the students being divided into 11 groups. Children were told the investigator needed their help in determining what types of stories children liked to read. Subjects read the stories silently, indicated the sex of each first-person protagonist, and rank-ordered the stories by preference. Answer sheets were collected, the investigator revealed the "correct" sex of each narrator, and subjects then re-ranked the stories by preference.

Students' inferences of sex of first-person protagonists were scored +1 if the student responded positively to the sex role stereotype implanted in the story, and 0 if the student responded in a nonstereotyped manner to a stereotyped first-person protagonist. Range of stereotype scores was +8 (subject inferred each of eight first-person protagonists' sex according to implanted sex role stereotypes) to 0 (subject inferred all eight protagonists' gender in a nonstereotyped manner).

Socioeconomic information, students' birthdates, sex, and reading achievement scores were gathered from cumulative folders provided by the school.

RESULTS

Squared semipartial correlations from a multiple regression analysis (Kerlinger and Pedhazur, 1973) were examined to determine the relative contribution of each of the four independent variables (sex, age, socio-economic status, and reading ability) to the variance of the dependent variable (stereotype score) when the other three independent variables were held constant. Reading level and age were significant contributors to the stereotype score ($p < .05$) (see Table 1). Coefficients of correlation between the five variables (see Table 2) revealed only a moderate correlation ($r = 0.24$) between reading ability and age. Wilcoxon matched pairs sign rank t-test (Hays, 1963) showed no significant differences in students' ranking by preference of the eight story segments either before or after role reversal of first-person protagonists.

DISCUSSION

The statistically significant contributions of age and reading ability to sex role stereotypic schemata, as measured by children's inference of sex of first-person protagonists when sex role stereotypes were implanted in story segments, lends support to Kohlberg's (1966) cognitive-developmental model for the acquisition of children's sex role stereotypic schemata. The child's growing understanding of his own sexual identity, coupled with developing understanding of the content of the sex roles prescribed by the surrounding culture, determines the child's behavioral choices; in this case, inference of gender of first-person protagonists. Age and reading ability appear to affect students' inferences of sex of protagonists; the older the student, and/or the better the reader, the more stereotypic the inference. While first-person protagonists' role reversal resulted in some changes in reader preference for story segments, not enough readers changed their minds to show statistically significant differences. Once a reader developed preference for a story segment, he maintained that preference, suggesting that reader preference may hinge on story content, or on the strength of children's desire for consistency.

Examination of students' rank-order preferences showed readers preferred stories featuring stereotyped male, stereotyped female, or nonstereotyped female protagonists as compared to stories depicting nonstereotyped males in feminine roles. Maccoby and Jacklin (1974) reported results of several studies which substantiate the theory that more social pressure against inappropriate sex typing is directed at boys than at girls. Intuitively, it seems that a boy would be subject to more disapproval for being a "sissy" than a girl would be for being a tomboy.

In conclusion, replications of this study with differing samples of children are suggested as measurement of elementary students' sex role stereotypic schemata. This should be accomplished in order to determine the extent to which children of differing ages and environments are sex role stereotyped, before changes are made in textbooks and curriculum. Even then, as Bender (1976) notes, while elimination of sexism in texts and curricula may have some effect on sex role development, the schools cannot be expected to overcome the effects of mass media, the structure of the occupational world, and the messages of the culture which impinge on the student.

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TABLE 1

Multiple Regression Analysis of Independent Variables
Contributing to the Variance of Stereotype Scores

Predictors	**R^2**	**Difference[a]**	**F**
All Four	0.1255		
Sex Omitted	0.1225	0.0030	0.67
Reading Level Omitted	0.0616	0.0639	14.16*
Age Omitted	0.1014	0.0241	5.35*
Socioeconomic Status Omitted	0.1237	0.0018	0.40

[a] The difference between R^2 with all four predictors and R^2 with a specific predictor omitted is the squared semi-partial $\underline{r}$ between the omitted predictor and the control.

*$F_{.05} = 3.89$; df = 1, 194

TABLE 2

Coefficients of Correlation Between Five Variables
(N=199)

	Sex	**Reading Level**	**Age**	**Socioeconomic Status**	**Stereotype Score**
Sex	----	−0.08	−0.12	−0.05	0.01
Reading Level		----	0.24	−0.05	0.30
Age			----	−0.34	0.25
Socioeconomic Status				----	0.09
Stereotype Score					----

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ATTITUDES TOWARDS READING AND LEARNING FROM TEXT

An attitude represents a readiness to respond with a particular kind of behavior (Russell, 1956). However, an attitude is not a general behavior, but a specific response to a particular stimulus, such as a statement in an attitude scale. Consequently, if a particular statement changes in a significant way, then we would also expect the elicited response to change. In short, the way a statement is worded affects the kind and/or strength of the elicited response. Indeed, some words or phrases which may be neutral in general are likely to elicit strong reactions when used in particular contexts.

READING: AN AMBIGUOUS TERM

The term "reading" in the context of the role of the high school teacher is likely to elicit a non-neutral reaction. One reason that it is likely to elicit an affective reaction in this context is that it is an ambiguous term. It can refer to (1) learning to read, which may be narrowly defined as learning to say or orally reconstruct printed words (Goodman, 1976), or (2) reading can refer to comprehension, which may be defined as an association of meaning to orally reconstructed words (Goodman, 1976) or as an interaction between the text and the reader's hierarchical structure of knowledge (Adams & Collins, 1977; Anderson, Spiro & Montague, 1977; Rumelhart, 1976; Singer, 1976). Since reading can refer to either the initial phase of learning to read or to the second but overlapping phase of comprehension, it is not surprising that confusion exists in communications when the term "reading" is used.

Those secondary teachers who define reading in its narrow sense may react negatively because they feel that teaching students how to read is not an appropriate role for a secondary teacher, while those secondary teachers who react to reading as comprehension may react favorably because they are trying to teach students to comprehend their texts.

DIFFERENTIATION OF THE TERM "READING"

To disambiguate the term "reading", I have used the phrases "reading acquisition behavior" for the initial phase of reading instruction and "gaining information from text" or simply "learning from text" (LFT) for the subsequent, but overlapping phase of reading instruction. The dominant instructional emphasis in the primary grades is on reading acquisition behavior but as this phase of reading is mastered, the emphasis in reading instruction shifts to learning from text (Singer, 1977, 1978; Singer & Donlan, 1980).

MODIFICATION OF THE OTTO-SMITH SCALE

Otto and Smith constructed a scale for assessing "Attitudes Toward Teaching Reading in the Content Areas" and administered their scale to junior and senior high school teachers. They found that their teachers on the average scored about the mean on the scale. Where the average or "undecided" or ambivalent value of the scale is 42, the teachers' mean was 42 at the junior high level and 45 at the senior high level.

On the assumption that secondary teachers would react more favorably to the phrase "learning from text" we decided to modify the Otto-Smith Scale. Our modification consisted of simply substituting the phrase "learning from text" wherever the term "reading" occurs in the scale. We also had to make some minor grammatical adaptations to fit the change in wording, as shown in Table 1.

DESCRIPTION OF THE SAMPLE

Then we administered both scales by assigning them randomly to 68 experienced and 49 inexperienced high school teachers. The inexperienced teachers were students enrolled in summer session courses at the University of California, Riverside. The experienced teachers were teachers at Ontario High School, Ontario, California.

RESULTS

The mean scores on the two scales for the inexperienced and experienced teachers are plotted on Figure 1. The results indicate that a more favorable

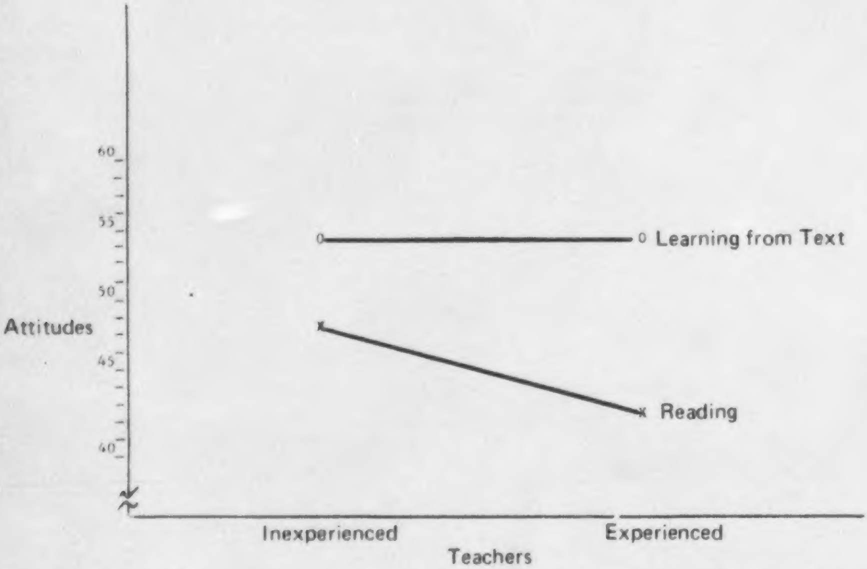

Figure 1: Attitudes of Inexperienced and Experienced Teachers on Teaching Reading vs. Learning from Text

response occurs to the Learning From Text Scale for both inexperienced and experienced teachers. For the total on each scale, the mean for the Learning From Text Scale is 53.1 while the mean for the Reading Scale is 44.5.

To test the statistical significance of the difference, a two-way analysis of variance was performed. The results showed that the difference between the two scales was significant at the .0001 level ($F(1,103) = 28.23$, $p < .0001$) with a much more favorable attitude on the Learning from Text Scale. But, the difference between inexperienced and experienced teachers was not statistically significant. Nor was there any significant interaction by experience and inventory. The results are almost identical for the two groups on the Learning From Text Scale (Mean = 52.7, S.D. = 4.8 for inexperienced and Mean = 53.3, S.D. = 7.3 for experienced teachers), while on the Reading Scale the experienced teachers have a less positive attitude (Mean = 42.5, S.D. = 9.8) than the inexperienced teachers (Mean = 46.8, S.D. = 6.7).

ITEM ANALYSIS

Since the difference between the experienced and inexperienced teachers was not significantly different, we combined them. We then did chi-square analyses of the items on the Reading vs. Learning From Text Scales. The results of these analyses are shown in Table 1.

The table shows the items for each scale. The underlined phrase in each item of the Reading Scale was omitted and the phrase in the parentheses was substituted to change the item into a Learning From Text item. The percent of responses to each item on each scale is shown next to each item. On the far right side, the p-value of the chi-square test is shown. The underlined p-values indicate those items that are statistically significant at the .05 level or

TABLE 1

Attitudes of Secondary Teachers to Teaching Reading vs Learning from Text[1] Tested by Chi-Square for Significance of Difference

		SA[2]	A	U	D	SD	p-value
1. In the secondary school *the teaching of reading* (teaching students to learn from text) should be the responsibility of reading teachers	Rdg	2.0	10.0	14.0	28.0	44.0[3]	
	LFT	0.0	5.3	8.8	43.9	40.4	.48
2. Secondary teachers can teach *reading* (students to learn from text) effectively without special university courses in methods of teaching reading.	Rdg	2.0	10.0	22.0	44.0	22.0	
	LFT	0.0	28.1	31.6	35.1	5.3	.01
3. *The teaching of reading skills* (teaching skills in learning from texts) can be incorporated into content area courses without interfering with the major objectives of these courses	Rdg	26.0	42.0	10.0	14.0	6.0	
	LFT	35.1	45.6	17.5	1.8	0.0	.04
4. Any secondary teacher who assigns *reading* (chapters in texts) *should teach his or her* (for students should teach the) students how to acquire information from these chapters.	Rdg	22.0	48.0	8.0	14.0	8.0	
	LFT	59.6	21.1	10.5	8.8	0.0	.0005

(continued on next page)

Table 1 (continued)

		SA[2]	A	U	D	SD	p-value
5. With rare exceptions, students should know what there is to know about *reading* (learning from texts) before they are permitted to leave the elementary school.	Rdg	30.0	30.0	14.0	12.0	12.0	
	LFT	10.5	28.1	21.1	33.3	7.0	.02
6. Only remedial reading should be necessary in the secondary school and that should be done by remedial reading teachers and special teachers.	Rdg	4.0	20.0	14.0	28.0	34.0	
	LFT	1.8	14.0	19.3	36.8	28.1	.66
7. Teaching *reading* (students to learn from texts) is a technical process that secondary school teachers generally know nothing about.	Rdg	8.0	26.0	34.0	26.0	6.0	
	LFT	1.8	22.8	26.3	28.1	21.1	.12
8. Secondary school teachers cannot teach *reading* (students how to gain information from texts) without special materials designed for that purpose.	Rdg	8.0	16.0	20.0	38.0	14.0	
	LFT	0.0	10.5	15.8	50.9	22.8	.08
9. Teaching *reading* (how to learn from texts) is a necessary and legitimate part of teaching any content course in secondary school	Rdg	26.0	32.0	20.0	14.0	6.0	
	LFT	45.6	45.6	1.8	7.0	0.0	.002
10. Teaching *reading* (students how to gain information from texts) takes all the fun out of teaching at the secondary school level.	Rdg	0.0	6.0	22.0	36.0	34.0	
	LFT	1.8	1.8	5.3	47.4	43.9	.06
11. Every secondary teacher should *be a teacher of reading* (teach students how to learn from texts).	Rdg	12.0	22.0	20.0	22.0	22.0	
	LFT	38.6	33.3	10.5	14.0	3.5	.002
12. At the secondary school level students want to learn content, not how to *read* (learn from texts)	Rdg	6.0	26.0	18.0	40.0	4.0	
	LFT	1.8	8.8	19.3	50.9	19.3	.009
13. Integrating the teaching of *reading* (learning from texts) with the teaching of specific content can be as exciting for the content area teacher as teaching content only.	RDG	18.0	30.0	32.0	10.0	4.0	
	LFT	28.1	40.4	28.1	1.8	0.0	.11
14. Content area teachers in the secondary school are probably more competent to teach the *reading* (learning from text) skills needed for their subjects than special reading teachers.	Rdg	6.0	20.0	20.0	36.0	14.0	
	LFT	12.3	38.6	28.1	19.3	1.8	.009

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[1] The words in italics were deleted and the words in parentheses were substituted in changing from the Reading to the Learning from Text Inventory.

[2] Key: SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, SD=Strongly Disagree.

[3] Total percents may be less than 100 because nonresponse percents are not shown.

less. For example, an item in Table 2 is to be read in the following way:

The first item of the Reading Scale (abbreviated in the table as Rdg) consists of this statement or stimulus: "In the secondary school the teaching of reading should be the responsibility of reading teachers only." Of the secondary teachers who responded to this item, 2 percent strongly agreed, 10 percent agreed, 14 percent were undecided, 28 percent disagreed.

The first item was then modified to make it fit a Learning From Text Scale (abbreviated in the table as LFT). The item then stated: "In the secondary school, teaching students to learn from text should be the responsibility of reading teachers only." No secondary teachers who responded to this item or stimulus strongly agreed at all, 5.3 percent agreed, 8.8 percent were undecided, 43.9 percent disagreed, and 40.4 percent strongly disagreed.

Although a small shift occurs towards disagreement, the difference in distribution of responses to the two forms of item had a p-value of only .48, which indicates the difference was not statistically significant. Thus, on the issue of *responsibility* secondary teachers do not differ, whether the wording is "reading" or "learning from text." But, on other scales, they disagree with the statement that such instruction should be the responsibility of the reading teacher only.

On the second item, which focuses on *preparation,* a significant difference, $p = .01$, occurs. Secondary teachers tend to disagree that they can teach reading without special university courses. However, they tend to shift towards agreement that they are prepared to teach students to learn from text. But, even though a significant shift in attitude occurs, a high percentage are still undecided or disagree that they can teach students to learn from text without having a special course to prepare them for doing so.

The third item centers on *conflict in objectives:* between teaching content vs. skills for learning content. Secondary teachers would have less conflict in integrating learning from text skills in content area classes than they would in incorporating the teaching of reading skills.

The fourth item, *assignment,* indicates that secondary teachers tend to agree more that they assign *chapters in text* than they do *reading* and that although they will help students learn how to gain information from either assignment, they are signficantly more agreeable that they will teach students how to gain information from assigned chapters in texts.

The fifth item is on *proficiency standards.* Significantly more secondary teachers agree that students should have mastered reading before being allowed to graduate from elementary school, but they disagree that students should know what they need to know about learning from text when they graduate from elementary school. Apparently secondary teachers recognize that it is normal for high school students to have to learn from texts.

Item 6 concerns *remedial reading.* Both scales had the identical statements. The difference in responses on the two scales, as expected, was not significantly different. Secondary teachers disagree that only remedial reading should be necessary in high school and that it should be the responsibility of reading teachers.

Item 7 emphasizes that teaching reading or learning from text is a *technical process.* Although teachers do not differ on this item, they tend to disagree more that they know nothing about teaching students to learn from text than they do about teaching reading.

Item 8 deals with *materials* for teaching. Although the difference is not significant, secondary teachers disagree more that they need special materials for teaching students to learn from text than they do for teaching reading.

On *legitimacy,* item 9, both scales elicit a favorable reaction, but significantly more teachers agree that teaching students to learn from text is a necessary part of teaching any content area course.

On *enjoyment* in teaching, item 10, teachers disagree that teaching reading or learning form text takes all the fun out of teaching.

On *slogan,* item 11, secondary teachers agree that every secondary teacher should teach students to learn from text, but disagree that they should be a teacher of reading.

Student objectives, item 12, secondary teachers feel that students do not differ significantly on wanting to learn content, not reading skill or learning from text. But more teachers disagree with the statement that students want to learn content, not how to learn from text.

Integration of skill (reading or learning from text) with content, item 13, teachers agree that this integration can be as exciting for the content teacher as teaching content alone.

Item 14, *competence* in teaching reading or learning from text. Secondary teachers feel they are significantly more competent to teach students learning from text skills, as contrasted with teaching reading skills, for their subjects than are special reading teachers.

Thus, the phrase "learning from text" elicits a significantly more favorable attitude on eight of the 14 items. On the other six, the difference is not statistically significant when "learning from text" is used in place of "reading," but all six of these items on both scales elicit favorable responses towards teaching learning from text or reading.

CONCLUSION

For the past 30 to 40 years (Strang, McCullough, & Traxler, 1967), reading specialists have been telling secondary teachers that every teacher is a teacher of reading. But, as indicated by the *Otto-Smith Scale on Attitude Towards Teaching Reading in the Content Areas* (italics mine), secondary teachers are, in general ambivalent or slightly favorable. But, when this scale was converted to the *Singer-Otto-Smith Scale for Attitudes Towards Learning From Text in the Content Areas,* a significantly more favorable attitude was elicited. In fact, as explicitly indicated by comparison between both scales on item 11, secondary teachers are significantly more agreeable to the "learning from text" than to the "reading" slogan. Indeed, our anaylsis indicates that instruction for the typical student shifts in emphasis from learning to read to learning from text as the student progresses through the grades. Consequently, the term reading needs to be differentiated into these two phases. Secondary teachers also sense that teaching students to learn from text is more acceptable and more in agreement with their role as secondary teachers. Therefore, if a slogan is to be used that will get a more favorable reaction, we conclude it should be that "every secondary teacher teaches students to learn from text."

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THE APPLICATION OF SIGNAL DETECTION THEORY TO READING

Traditionally, oral reading has been one of the cornerstones of beginning reading instruction. A significant proportion of many children's early training in reading consists of their reading orally and listening to other students read, and the accuracy of children's performance on oral reading tasks is often the basis on which they are evaluated. Recently, a number of theorists have expressed opposition to the practice of laying great stress on the accuracy of students' oral reading (Goodman, 1965; LaBerge & Samuels, 1974; Smith, 1975).

Smith (1975) has been particularly emphatic in denouncing the practice. Among the sources he draws on in arguing against the over-emphasis on accuracy is a model of information-processing known as signal detection. Signal detection theory emerged from research on the decision-making behavior of radar operators (Swets, 1973; Swets & Tanner, 1954; Swets, Tanner & Birdsall, 1961). Basically, the radar operator's task is to decide whether a "blip" on the screen represents an unauthorized aircraft or merely interference — "noise." Contrary to common belief, the problem has four, not two, possible outcomes. These four outcomes are termed Hits, False Alarms, Misses, and Correct Rejections. A Hit occurs when an operator decides that a blip is an aircraft when an aircraft is present. A False Alarm occurs when an operator decides a blip is an aircraft when no aircraft is present. A Miss occurs when the operator decides incorrectly that a blip is noise, and a Correct Rejection occurs when an operator decides correctly that a blip is noise.

Furthermore, it is not the case that the more often operators' decisions are correct, the less often they are incorrect. Rather, there are two types of correct decisions and two types of incorrect decisions. The two types of incorrect decisions, False Alarms and Misses, are inversely related. Therefore, operators face a dilemma; the more they want to minimize Misses, the more they must tolerate False Alarms; and the more they want to minimize False Alarms, the more they must tolerate Misses. Researchers have theorized that, given this predicament, operators establish recognition criteria specifying the amount of information required before deciding that a blip is noise or an aircraft. A high criterion is selected to minimize False Alarms; a low criterion is selected to minimize Misses. The selection of a criterion is based upon the probability that a blip represents an aircraft, coupled with the perceived costs of the various outcomes.

Smith argues that readers' behavior is influenced by some of the same factors that influence radar operators. Readers established recognition criteria based in part upon the amount of certainty they require before making a decision. Readers afraid of mispronouncing a word (committing a False Alarm) will require a great deal of visual information before attempting to pronounce it. Such readers, however, risk making another type of error, one of omission or hesitation (committing a Miss). Smith contends that a teacher stressing oral reading accuracy may induce children to set too high a criterion. The results may well be fewer mispronunciations, but the concomitant results are likely to be omissions or hesitations. Too great an emphasis upon accuracy will result in poorer comprehension, since readers are unable to process enough information to understand what they are reading.

Although Smith's argument is a powerful one, the relationship between signal detection theory and actual reading behavior has not been directly investigated. The purpose of this study was to examine that relationship by inducing one group of readers to adopt a high criterion and another group to adopt a low criterion. The hypotheses were as follows: (a) subjects induced to adopt a high criterion would make more errors of omission or hesitation (Misses) than those induced to adopt a low criterion; (b) the low criterial group would commit more oral miscues (False Alarms) than the high criterial group; (c) the high criterial group would require more time to complete the reading task than the low criterial group; and (d) the low criterial group would demonstrate better comprehension than the high criterial group.

METHOD

Subjects

Subjects for the study were 30 university undergraduate volunteers randomly divided into two equal-sized groups.

Materials

Materials consisted of a 300 word passage, two sets of instructions, and a multiple-choice test.

The passage delt with sociolinguistics and was taken from an article in *Language and Social Behavior* (Robinson, 1972, pp. 77-78). Within the passage, ten percent of the words were randomly selected and altered such that all letters but the first were deleted. As a result, the words altered represented various word classes, served a variety of grammatical functions, and occurred at a variety of intervals. An altered sentence from the passage is shown below.

> It is alleged t   some teenagers and some not-so-teenagers plug themselves i   continuous transistorized m   to save themselves f   thinking.

This passage was altered to simulate the situation in which beginning readers are confronted with a text containing words they find difficult, a situation which makes the text as a whole difficult.

One set of instructions was designed to induce subjects to adopt a high criterion, and the other was designed to induce subjects to adopt a low criterion. Subjects receiving instructions designed to induce the high criterion were told, "You will be evaluated on the basis of the number of words you mispronounce. Use whatever decoding skills you possess in your reading, therefore, keeping in mind that I will be counting the number of mispronounciations you make." Subjects receiving the instructions designed to induce the low criterion were told, "You will be evaluated on the basis of the ease and fluency with which you read the passage. Don't hesitate over individual words, therefore. Read the passage as smoothly and naturally as you can." Subjects receiving both sets of instructions were also told that they could encounter words which would be difficult because all letters except the first have been deleted; they were not told that a comprehension test would follow.

The multiple-choice test consisted of ten, four-option, text-dependent literal questions.

Design and Analysis

The experiment employed a single between-subjects variable, *instructions,* with two levels (high criterial instructions, low criterial instructions). It employed four dependent measures: Misses, False Alarms, Comprehension, and Time. Four one-way analyses of variance were used, one for each dependent measure.

Procedure

Testing was done individually. The experimenter read each subject one or the other set of instructions. The subject was taped as he or she read the passage orally; the subject then took the test without looking back at the passage.

Scoring

The four scores of interest were the number of Misses on the passage, the number of False Alarms on the passage, the time (in seconds) required to read the passage, and the number correct on the comprehension test. A Miss was scored when a subject either omitted any word in the passage entirely or failed to give an oral response to any word in the passage within two seconds. A False Alarm was scored when a subject made an incorrect verbal response to any word in the passage within two seconds.

RESULTS

The results of the study can be presented succinctly. As hypothesized, the low criterial group produced significantly fewer misses than the high criterial group, $F(1,28) = 5.60$, $p < .05$, with the mean number of misses for the low and high criterial groups being 9.53 and 13.28, respectively. As hypothesized, the low criterial group produced significantly more false alarms than the high criterial group, $F(1,28) = 9.70$, $p < .01$, with the mean number of false alarms for the low and high criterial groups being 13.67 and 8.60, respectively. And as hypothesized, the low criterial group read the passage significantly faster than the high criterial group, $F(1,28) = 9.76$, $p < .01$, with the mean reading times for the low and high criterial groups being 139.07 and 190.07 seconds, respectively. However, contrary to the hypothesis, the comprehension scores of the two groups were precisely the same, 3.93.

DISCUSSION

The data generally support the claim that the signal detection model can be used to describe reading performance. The results indicate that readers adopt criteria for recognizing words in much the same way that radar operators adopt criteria for detecting signals. Thus, recognition of words seems to depend on readers' assessment of the risks involved in committing a certain type of error, as well as their ability to identify the words. The data also fit the signal detection model with respect to the interdependence of False Alarms and Misses; that is, as the number of mispronunciations decreases, the number of hesitations and omissions increases. Furthermore, it is apparent that readers can be influenced by someone else, such as a teacher, to adopt a high or low criterion.

The single result that raises questions about the similarity between readers' behavior and that of radar operators is the finding that those induced to adopt a high criterion and those induced to adopt a low one displayed similar comprehension. One explanation which would account for this result is that the test was relatively insensitive and too difficult, with the score of the two groups (3.9) reflecting little more than the guessing rate of four-option, multiple-choice items. Another explanation is that since subjects were not told that they would be given a comprehension test, they made little effort to learn and remember the material. If either of these explanations is valid, then future research which uses easier and more sensitive tests and which informs subjects that they will be tested may demonstrate that stressing oral accuracy has a detrimental effect on comprehension. However, even if the failure of the two groups to achieve different scores is a valid result and not simply an artifact of this experiment, it should be noted that the emphasis on accuracy produced no better understanding of the text that did the opposite emphasis, even though the high criterial group spent over 35 percent more time reading the passage than did the low criterial group.

The implications of these results for classroom teachers is that stressing oral reading accuracy, long an accepted practice in beginning reading instruction, can lead to undesirable consequences. The fact that children are making few errors of mispronunciation does not necessarily mean that they are reading well. It may mean that such children are concentrating unduly on visual and orthographic information at the expense of higher order information, and are therefore unable to organize and understand what they read. Moreover, it appears that teachers may have considerable power to influence children's selection of criteria. It would seem important, therefore, for teachers to relax, at least sometimes, demands for accuracy. This is not to say that oral reading errors should be ignored. Rather, the evidence suggests that accuracy should not be viewed as an end in itself, nor should it be used exclusively as an indicator of children's overall reading performance.

In conclusion, the results of the present study do indicate that signal detection theory is applicable to investigations of reading. At the same time, the study definitely has limitations, and more research is needed. Future research should employ subjects at various levels of reading proficiency, particularly beginning and remedial readers; material which is not altered and which is representative of the reading the subjects normally do, particularly the reading required in school; and tests which are sensitive enough to reveal any differences that occur, possibly recall protocols.

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RATE OF COMPREHENSION FLEXIBILITY — A NEW MEASUREMENT PROCEDURE

This study presents a new technique for constructing tests of reading flexibility. The technique assesses the ability of an individual to adjust the rate with which he/she reads and solves comprehension questions embedded within a series of passages, to the readability levels of these passages. It is believed that this procedure overcomes some of the inherent limitations of previous attempts to measure various types of reading flexibility and yields results which may be of greater educational significance than those results produced by previously established techniques.

Many different conceptions of reading flexibility have been found in the literature. Weintraub (1967) summarizes a variety of these concepts in the following definition: ". . .the ability to adjust one's rate and approach to reading with the purpose for reading, with the difficulty of the material, and with one's background of knowledge of the particular subject matter." A comprehensive treatment of various conceptualizations of reading flexibility and attempts to measure this skill(s) is to be found in *The Measurement of Reading Flexibility* by Rankin (1974).

Despite considerable research on this topic over many years, we have very few published tests of this skill(s). There are a number of technical flaws in most tests. Reading flexibility is not a major topic in any reading textbook. This skill is not directly taught in the reading curriculum; rather it is expected to be developed indirectly as an outgrowth of the development of other skills. Reading flexibility is not an integral feature of theoretical models of reading comprehension. There is considerable confusion among professionals in the field regarding its meaning and its educational significance.

A generalized model for reading flexibility was presented by Rankin (1974). From the standpoint of this model, reading flexibility involves a relationship between one or more independent variables, such as difficulty of material or reading purpose, and one or more dependent variables, such as reading rate or cognitive processes. Changes in rate are usually interpreted as reflections of underlying changes in cognitive processes. The following discussion will be organized around problems of measuring reading flexibility using as independent variables first, purpose, and second, readability of materials.

Many studies have been conducted in which reading flexibility has been measured by comparing the reading rates of readers who are reading either the same or different materials for various purposes, e.g. Walker (1938), Letson (1959), McDonald (1968). Purposes for reading have most often consisted of reading for main ideas versus details. Other investigators like Smith (1964) have investigated more subtle differences in reading purposes. In general, it can be said that the results of most studies which have manipulated purpose in the measurement of reading flexibility have indicated a very limited amount of flexibility among readers at all age levels. A number of problems in measurement techniques may account for these essentially negative results. First, in assigning a purpose for reading, many of the directions to the reader have been vague and lacking in specificity so that the reader does not know precisely what is expected. Second, it is never known by the investigator whether or not readers in fact accept an assigned purpose even if they understand it. Third, the comprehension questions asked following the reading of a passage for an assigned purpose have not always been appropriate to that purpose. Fourth, some tests have expected readers to infer a purpose appropriate to the material without providing adequate instructions.

A more promising approach to measuring this type of flexibility was carried out by Samuels and Dahl (1975). Samuels and Dahl hypothesized that the negative finding resulting from many studies of reading flexibility resulted from failure to establish an appropriate purpose for reading. Their attempted solution to this problem was to provide practice in reading for two different purposes before taking the test so that the students could have a specific notion of the operational meaning of the assigned purpose. These investigators obtained highly significant differences between two groups assigned to read passages for different purposes. This finding has important implications for the present investigation. Reading purpose is made abundantly clear by embedding comprehension items throughout each passage.

Many attempts have also been made to measure reading flexibility by varying the readability level of materials or portions of materials, e.g. Flesch (1949), Brown (1952), Letson (1959), Rankin and Hess (1970). In contrast to the previously described measurements of "purpose" reading flexibility, studies of "reading difficulty" reading flexibility have yielded better results. Letson (1959) demonstrated that students are better able to adjust their rate of reading to differences in reading difficulty than they are to differences in assigned reading purposes. There is no problem in these studies about the reader's acceptance of or understanding of the independent variable. There are, however, problems inherent to these measurements which have not been adequately resolved. First, how does one choose the readability level of the material relative to the reading comprehension level of the students? Second, how much difference between the readability levels of two articles should one choose? Third, if only two or three readability levels are chosen, can the results of such a measurement procedure be generalized to a variety of other materials written at different levels and on different topics?

Common to the measurement of both "purpose" reading flexibility and "reading difficulty" reading flexibility is the problem of measuring differences in reading rate for the same individuals. Rates of reading are highly correlated for the same reader on different materials written on different topics and at different levels of difficulty. Unfortunately, it is known that "gain scores" between correlated measures have a low reliability and high errors of measurement. Many measurements of reading flexibility have been carried out without taking this basic statistical fact into consideration. An attempt to get around this measurement problem was made by Rankin and Hess (1970) by measuring flexibility through use of correlation coefficients. This technique produced a "flexibility coefficient" for each student by correlating the difficulty of a given segment of material with his rate for that segment. This study also has important implications for the current investigation. Flexibility coefficients will be used to avoid the inherent limitations of gain scores.

Still another measurement problem common to both types of reading flexibility discussed in this paper, is the way that rate has usually been measured in these tests. With the exception of scanning tests, rate is typically assessed by counting the number of words that readers have presumably read during specific periods of time independently of the measure of comprehension. For most research purposes, this is a legitimate method of measuring reading rate. However, since rate as a dependent variable in the measure of reading flexibility, must intimately reflect changes in reading "approaches," rate should be measured in such a way as to reflect time spent in solving cognitive problems while reading. Failure to do this may be a significant weakness in many previous attempts to measure reading flexibility using rate as a dependent variable.

THE SIGNIFICANCE OF READING FLEXIBILITY

Despite the considerable amount of measurement and research studies which have been carried out on the topic of reading flexibility, there is little hard evidence that either "purpose" flexibility or "reading difficulty" flexibility are essential either to effective reading or to educational attainment. Studies by Shores (1961), Levin (1968), and others have found that good readers are somewhat more flexible than poor readers. But the relationship is not strong and it differs with different types of reading flexibility. For example, Levin (1968) using bright ninth-grade girls as subjects, found no relationship between "reading difficulty" flexibility and the Speed of Comprehension Score on the *Cooperative English Test* (Reading), the *Otis Quick Scoring Test of Mental Abilities,* or average school marks. He did find small but significant correlations of .37, .33, and .40 between a measure of "purpose" flexibility and these three criterion variables, respectively.

Rankin and Kehl (1972), using a large sample of two hundred twenty-five college freshmen as subjects, found only a one point mean difference in comprehension for individuals who tended to read difficult segments of prose more slowly than easier prose segments (i.e. conventional flexibility) as contrasted with readers who actually read the more difficult segments at a faster rate than the easier segments (i.e. negative flexibility). Metsker (1967), using sixth grade students, compared high "reading versitility" students with low "reading versatility" students. She found that the flexible readers spent less time reading the daily newspapers, did not read more books, and spent no more time participating in out-of-school activities than the students with low "reading versatility scores." It is interesting to note that of the four published tests of reading flexibility located by the writer — Spache and Berg (1958), Braam and Sheldon (1959), McDonald (1968), and Raygor (1970), no evidence is given by the test authors concerning the relationship between reading flexibility scores and reading comprehension or educational attainment.

Despite the lack of empirical evidence concerning the educational significance of reading flexibility, the opinions of most authorities and just plain common sense would suggest otherwise. From the standpoint of the psychology of reading, it seems reasonable to expect superior readers to use different ways of thinking and corresponding rates of reading both in reading for various purposes and in reading materials of varying difficulty. Failure to do this must certainly result in poor comprehension, which should be related to educational acheivement.

The writer believes that the essentially negative findings in the search for

279

educationally significant correlates of reading flexibility may stem from previously discussed deficiencies in measurement procedures. The current investigation reflects an attempt to avoid these previously mentioned measurement problems and to formulate a strategy for measuring reading flexibility which has more promise of providing useful information about an important, though neglected, aspect of reading.

TEST DEVELOPMENT

A test was developed to measure "rate of comprehension flexibility." "Rate of comprehension" is the rate at which a person processes information encoded on the printed page and demonstrates understanding of that message by attempting to solve cognitive problems posed by comprehension questions embedded in the message. "Rate of comprehension flexibility" indicates the relationship between the readability of a heiarchical series of passages and a reader's rate of comprehension for those passages. Such a test could be developed in a variety of different ways. The writer chose to select passages from the *Degrees of Power Test* which is being developed under the auspices of The State Education Department of New York. Although this test was not developed for the measurement of reading flexibility, it possesses several desirable features which make it ideal for the purposes of this study: 1. It contains a large number of passages written at various readability levels from elementary to college level. 2. Each passage contains seven blank spaces which can be filled in by writing the number of the multiple-choice alternative which provides closure for that gap. 3. The passages cover a wide variety of topics which would facilitate generalization of test results to comprehension of other matierals. Considerable research has been carried out in developing this test which shows great promise as a new type of comprehension measurement.

For this study, eleven *DRP* passages were selected ranging in readability from grade 2.8 to 18.0, using the Spache formula for the easy passages and the Dale-Chall formula for the more difficult passages. Since each paragraph contained seven questions, there were seventy-seven total comprehension items. Each passage was approximately three hundred seventy-five words in length. Two test forms were devised using odd versus even numbered passages and admistered upon two successive days, under the assumption that the total testing time for all eleven passages might exceed the limits of one class period. (However, it turned out that the testing time for the entire eleven passages was only twenty-eight minutes. Thus, more passages could have been used which would probably have increased the reliability of the test.) Experimental forms of the *DRP* have yielded parallel form reliabilities of approximately .90. The test developers have reported a validity coefficient of .80 between the *DRP* and the *California Achievement Test* (Reading) and .76 between the *DRP* and an any-word cloze test.

For purposes of this study, the test was modified so that each student timed himself on each passage. Students were instructed to write starting and stopping time for each passage, indicating time spent in reading plus answering questions, by using a flip-chart at the front of the room showing number of ten second intervals. Thus, all students started working at the same time, and thereafter each student worked at his own pace in starting and stopping work on each passage. Flexibility coefficients were computed for each individual student by computing Pearson correlations between the readability score for each passage and the rate of comprehensoin for each passage expressed as the number of ten second intervals. The split-half reliability for this test was .64. However, this reliability should have been made much larger simply by using more passages. For purposes of computing mean flexibility coefficients for groups, each flexibility coefficient was converted to Fisher's z' transformations.

RESULTS

In reporting results for this study, it should be noted that negative flexibility coefficients for individual students indicate the tendency to slow down in rate of comprehension as the material becomes more difficult (i.e. conventional flexibility). Positive flexibility coefficients for individual students indicate the tendence to speed up in rate of comprehension as material becomes more difficult (i.e. negative flexibility). For this group of forty-four sixth-grade students, there was an extremely wide range of reading flexibility varying from -.90 to +.82. The average flexibility coefficient was -.27 ($p > .05$) indicating only a small amount of flexibility for the group as a whole. This finding contrasts with the average flexibility coefficient of -.55 ($p < .05$) in another study using the same test based on forty-one college freshmen. The difference in average flexibility between sixth graders and college freshmen would be in line with expectations regarding maturation and learning in the development of reading skill. Thirty of the forty-four sixth-grade students displayed conventional flexibility (i.e. negative correlation coefficients) and fourteen of the students demonstrated negative flexibility (i.e. positive correlations). The average flexibility for students with conventional flexibility was -.55 ($p > .05$) whereas the average flexibility for students with negative flexibility was .41 ($p < .05$). The results in Table 1 are indicative of the educational significance of this type of reading flexibility.

TABLE 1

Mean Correlations between Rate Comprehension Flexibility Coefficients and Measures of Rate and Comprehension

Group	Total Rate of Comprehension[1]	Total Comprehension[2]
Total (n=44)	−.18	−.66*
Conventional Flexibility (n=30)	−.28	−.69*
Negative Flexibility (n=14)	+.17	+.01

[1] Total rate of comprehension indicates number of 10 second intervals required to complete work in all 11 passages.

[2] Total comprehension indicates number of comprehension questions answered correctly over all 11 passages.

*$p < .01$

Negative correlations indicate a negative relationship between flexibility and rate and a positive relationship between flexibility and comprehension. When correlating rate of comprehension flexibility coefficients with total rate over all eleven passages, it can be seen that there is no significant relationship between this kind of reading flexibility and total rate of comprehension over all eleven passages. It should be noted that the "total rate of comprehension" for all passages is computed by determining the sum of the individual "rate of comprehension" scores for all eleven passages. There is, however, a very strong relationship between rate of comprehension flexibility and comprehension scores achieved over all eleven passages. These findings are particularly important. It has been argued that reading flexibility measures using rate of reading as a dependent variable should demonstrate that fast readers are more flexible than slow readers because they have a wider repertoire of reading speeds from which to choose in reading various materials. It is an interesting feature of this type of reading flexibility that readers who read and solve problems rapidly are no more flexible than readers who perform more slowly. On the other hand, it is important to note that reading rate flexibility is quite strongly related to comprehension of the same passages upon which flexibility measurements are based. These correlations between a measure of reading flexibility and a comprehension criterion measurement are probably the largest reported in the literature. The average percent comprehension score for the total group was 68%. Those students reading with conventional flexibility attained a comprehension score of 74% as contrasted with a score of only 54% for those reading with negative flexibility.

In order to gain a better understanding of the nature of the relationship between reading rate flexibility and comprehension, a comparison was made between the rate of comprehension for the test as a whole and the total comprehension score for the test. (A positive correlation would indicate that a slow rate of comprehension is associated with a high comprehension score.) A correlations of .38 ($p < .01$) was obtained for the total sample. For the conventional flexibility group, a non-significant correlation of .24 was obtained. In contrast, a rather strong correlation of .66 ($p < .01$) was found for the negative flexibility group. These results permit us to conclude that for most readers (i.e. those with conventional flexibility) there is no significant relationship between the rate with which they read passages and solve comprehension problems and their comprehension of these passages. However, for those students reading with negative flexibility, there is a strong tendency for those with the slowest rate of comprehension to have the highest comprehension score. Yet, these are the very individuals who tend to read and work problems more *rapidly* as the material becomes more difficult. Thus, the very individuals who need to read slowly in order to understand are those who tend to speed up their rate of work as the material becomes more difficult. It is no wonder that their comprehension of the materials is lower than that of the conventional flexibility group.

SUMMARY AND CONCLUSIONS

Rate of comprehension flexibility appears to be a new and potentially valuable measurement procedure. Although this type of test uses rate as a dependent variable, this type of rate measurement is essentially a sensitive reflection of variations in cognitive processes involved in comprehension. Thus, we have a measure of reading flexibility which gives no advantage to fast readers and is strongly predictive of ability to comprehend materials. The use of many different passages covering a wide range of reading difficulties and topics should facilitate generalization of findings to other reading tests and real life situations. Findings on reading habits of readers who display "negative flexibility" raise serious questions regarding the use of speeded techniques for training such individuals in reading classes.

More research is needed on this newly developed technique using other materials and other types of test questions. Order effects of the heirarchical sequence of passage difficulties from easy passages at the beginning of the test to difficult passages at the end need to be studied. Correlational studies are needed between rate of comprehension flexibility and various reading skills. Evidence is needed on the effects of this type of reading flexibility upon academic performance and study skills. Finally, studies are needed in ways to train rate of comprehension flexibility and the effect of such training upon academic performance. This new test may well provide a heuristic paradigm both for measurement and the teaching of reading.

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284

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THE PSYCHOLINGUISTIC BASIS OF LINGUISTIC AWARENESS

If the generative grammarians (Chomsky, 1965; Chomsky & Halle, 1968) and the psycholinguists who have studied human sentence processing in the generative tradition (Fodor, Bever, and Garrett, 1974) are both at least roughly correct, the speaker-hearer of a language has two distinguishable sorts of tacit knowledge that may be called grammatical knowledge and performance knowledge.

On one hand, the speaker-hearer has knowledge of the grammar of his language. The grammar consists of a lexicon and sets of ordered rules. Each entry in the lexicon is a morphophonemic representation of a word together with associated syntactic and semantic information. The lexical forms for *heal* and *health*, for example, are /hēl/ and /hēl+θ/. The syntactic rules generate, that is, derive the complex word-order patterns of actual sentences from elementary "deep structure" patterns by a series of structural transformations. The phonological rules generate the phonetic forms of words (which represent their intended and perceived pronunciations) from their morphophonemic forms by processes of substitution, insertion, and deletion. Thus the phonetic forms [hīyl] and [helθ] are derived from /hēl/ and /hēl+θ/ by rules that shorten the long vowel of /hēl+θ/ and diphthongize and shift the quality of the same vowel of /hēl/. Notice that the morphological relationship of the two words, explicit in the morphophonemic forms, becomes opaque in the phonetic forms.

Grammatical knowledge is accessible in the sense that the speaker-hearer has intuitions about which phonetic contrasts are distinctive in his language and which are not; which syntactic patterns are acceptable and which are not. The validity of these intuitions is corroborated by the success of linguists in reconstructing descriptively adequate grammars from such intuitive data. Note, however, that there are limitations on the scope of grammatical knowledge. The speaker-hearer has very limited intuitions, for example, about the acoustic properties of the speech signal that can be shown to determine his phonetic perceptions (Liberman, Cooper, Shankweiler, and Studdert-Kennedy, 1967). Accordingly the grammar has nothing to say about the complex relationships between the phonetic representation of a sentence and its acoustic realization.

A child acquiring the grammar of his native language is rather in the position of a linguist. Given a theory of language specifying the structural properties that all grammars share and data as to correspondences between sound and meaning, he proceeds to construct the lexicon and the rules. Thus, from the phonetic forms [hīyl] and [helθ], and a notion of their meanings (as well as other parallel data), he infers the morphophonemic forms /hēl/ and /hēl+θ/ and the rules of shortening, dipthongization and vowel shift that relate the two phonological levels. (Obviously, this particular example illustrates a fairly advanced stage of language acquisition.) The child's position is different from that of the linguist mainly in that his general theory of language is innately given and superior to any general theory so far formulated by linguists. But having a task similar to the linguist's, he must have psychological mechanisms for doing what linguists do: making hypotheses about rules and about the content of lexical entries, generating hypothetical utterances and comparing them with observed utterances. Having hypothesized morphophonemic /hēl/ and /hēl+θ/ and rules of shortening diphthongization and vowel shift, he must have a specific mechanism that enables him to generate phonetic [hīyl] and [helθ], so as to test his hypothesis.

Opposed to this grammatical knowledge about the structure of words is the performance knowledge that enables a speaker-hearer to produce and understand actual sentences in real time. What the psycholinguists have argued is that performance knowledge must be very different in form from grammatical knowledge, even though the speaker is trying to produce grammatically well-formed sentences, and the listener understands sentences by constructing syntactic patterns that relate the meanings of individual words. But a speaker does not generate the sentences he utters, nor does the listener analyze the sentences he hears by applying the generative rules in reverse order. It appears, rather, that the listener's sentence-processor uses various pragmatic, often fallible "parsing strategies" based on the surface orderings of possible constituents. Though relatively little work has been done on lexical search in sentence-processing, we might suppose that it is carried out without reference to morphophonemic forms. Phonetic forms are associated with lexical entries, and the sentence-processor, provided with a phonetic representation of an utterance by the speech-perception mechanism, finds the entries for phonetic [hīyl] and [hel+θ], and extracts the syntactic and semantic information it needs, without reconstructing morphophonemic /hēl/ and /hēl+θ/. Notice, however, that the lexicon is a link between the grammar and the sentence-processor.

It cannot be concluded, however, that grammatical knowledge is after all psychologically unreal or that it has nothing to do with understanding sentences. Which parsing strategies will be appropriate depends in part on the syntax of the language, even though the sentence-processor does not make syntactic derivations. The semantic information available to the sentence-processor in lexical entries depends in part on the semantic properties of the morphemes from which words are formed, even though it does not do morphophonemic derivations. It seems likely, therefore, that the function of grammatical knowledge is to provide the sentence-processor, in the course of language acquisition, with an optimal set of parsing strategies and an optimal set of word-meanings. Having fulfilled this function, however, grammatical knowledge has at most a vestigial role in the actual process of understanding a sentence. (See the discussion of this point in Fodor et al., 1974, pp. 368-72).

A further difference between grammatical knowledge and performance knowledge is that while the speaker-hearer has grammatical intuitions he does not have intuitions about performance. What is known about the procedures of the sentence-processor, therefore, has been learned by experimental inference rather than linguistic analysis. In this respect, the sentence-processor resembles the speech perception mechanism.

How much must an actual speaker-hearer know about the grammar of his language to ensure a set of parsing strategies and word-meanings sufficient for ordinary understanding? Perhaps, relatively little, in comparison with the ideal speaker-hearer of linguistic theory. It is quite believable, for example, that a person might have parsing strategies that could cope, much of the time, with passive constructions, without having grammatical knowledge of the rules for generating passive sentences; and that he might have a functional understanding of the meanings of [hīyl] and [helθ] but no knowledge of the appropriate morphophonemic forms for these two words or of the phonological rules relating them. There is nothing in the processes of speaking and listening that compels him to learn such things.

To put the matter somewhat differently, the grammatical knowledge a language-learner is potentially capable of acquiring far exceeds the functional requirements of the sentence-processor. But if this is so, we should not find it surprising that some speaker-hearers, driven by an instinctive linguistic curiosity, continue acquiring the grammar of their language indefinitely, while others essentially abandon language acquisition once the sentence processor is adequately equipped for the purpose of ordinary communication.

Reading necessarily differs from listening because it is not possible to access performance knowledge directly with visual input. An orthography based on visual displays of acoustic wave-forms or on sound spectrograms is hardly conceivable, and even an orthography that was in effect a narrow phonetic transcription, equivalent to what a listener's speech-perception mechanism provides the parser, would be impractical. Instead, reading makes direct use of grammatical knowledge and exploits performance knowledge in a rather roundabout way.

As Chomsky (1970) points out, it is a general characteristic of orthographies that they appeal to the reader's knowledge of the morphophonemic forms of words, and not to morphologically opaque phonetic forms. In English orthography, the spellings *heal* and *health* correspond to morphophonemic /hēl/ and /hēl+θ/ not to phonetic [hīyl] and [helθ], and even in writing systems which leave segmental structure implicit, such as that of Chinese, it is obviously the morphological forms that are being transcribed. Apparent exceptions to this generalization — writing systems that are said to be "phonetic," turn out on examination to be used for languages which do not have highly elaborated phonologies, so that the morphophonemic forms themselves are fairly close to phonetic forms (Liberman, Liberman, Mattingly, and Shankweiler, 1978).

The evidence of orthography suggests that a reader looks up words in his mental lexicon morphophonemically, making use of his grammatical knowledge. On the other hand, sentences are not written in a way that makes their deep structure manifest, and it does not seem likely that the reader, any more than the listener, analyzes sentences grammatically. Instead, the reader presumably uses the same parsing strategies that he uses as a listener. In order to do so, he has to provide the sentence-processor with a phonetic representation of the sentence. This can readily be done once lexical search has been accomplished, since the lexicon is linked to the sentence-processor. In the case of a known word, its phonetic form is already associated with the lexical entry, if our account of lexical search in listening is correct.

The case of an unknown word is more interesting because it provides further support for the grammatical character of reading. In this situation, the reader is obliged, having established a new lexical entry, to generate a purely hypothetical phonetic form, using the phonological rules. The mechanism that permits him to do this is not part of performance knowledge. Nor is it a special trick he learns as a reader. It is rather, we suppose, the mechanism we have already considered that enables him to test candidate morphophonemic representations in the course of language acquisition. Note that the listener, hearing a new word, is not under similar pressure to analyze it morphologically, or to use this generative mechanism.

It appears that, the reader uses grammatical knowledge as well as performance knowledge when he reads; and that on occasion, he is obliged to rely on the same mechanisms by which this knowledge was acquired.

What has been said suggests that a good reader must have the phonology of his language to a substantially greater extent than suffices for mere speaking and listening. He is "phonologically mature" in the sense that the morphophonemic forms in his lexicon correspond to a large extent to the relatively abstract ones transcribed by the orthography, and in the sense that he knows the rules that relate these forms to phonetic forms. But it would be a mistake to regard such maturity as a prerequisite for learning to read. On the contrary, as we will see, phonological maturity develops as a consequence of reading.

What does seem to be an essential prerequisite is that we have called "linguistic awareness" (Mattingly, 1972): the ability of a speaker-hearer to bring to bear rather deliberately the grammatical, and in particular, the phonological knowledge he does have in the course of reading. To the linguistically-aware child, the phonological segmentation and the morphological structure of words is intuitively obvious, and the orthography seems reasonable, even though there may be substantial discrepancies between the orthographic transcriptions of words and his immature morphophonemic forms; to the child not thus aware, the principles by which the orthography transcribes words seem quite mystifying. If the child's production and understanding of spoken language seem normal, we must suppose that he knows a reasonable amount about the phonology of his language. But he is unable to make effective use of it in the task with which he is now confronted.

I believe that the considerable differences in degree of linguistic awareness that are observable in children are related to different patterns of language acquisition. As we have seen, some children seem to learn only enough of the grammar of their language to satisfy the functional requirements of the parser, and then to abandon the task of language acquisition. In such children, one might expect that at the age when reading instruction begins, grammatical knowledge would be not only more limited, but less accessible, and that acquisition mechanisms such as we have discussed would have atrophied. This mental state I would equate with lack of linguistic awareness. Such children might well have difficulty accessing the knowledge and reawakening the mechanisms required for reading, even though their speaking and listening might seem adequate.

Children of another sort, who have continued to learn the grammar of their language even after the minimal demands of the parser are satisfied, will be "linguistically aware." Their acquisition mechanisms are still in working order. Not only will they have greater phonological maturity than the first class of children, so that the orthography will correspond more closely to their mental representations of words, but also, these representations will be more accessible. Moreover, they are in a position to increase their phonological maturity. If a child does not already have the morphophonemic forms /hēl/ and /hēl+θ/ in his lexicon, and the associated rules in his phonology, he is quite likely to acquire this grammatical knowledge through reading (Moskowitz, 1973). Finally, since these children are still actively acquiring their language, they will see reading as a source of fresh data. The linguistic curiosity that motivates their continuing language acquisition will thus motivate them in learning to read as well.

My contention, then, is that linguistic awareness, essential for reading and for learning to read, is only indirectly related to speaking and understanding. It is more directly related to active language acquisition, and the awareness in question is an awareness of grammatical knowledge, of language in the form in which it is acquired. Such awareness, presumably intense in every child during the period when he learns to talk, has waned in many children by the time reading instruction begins. The reading teacher's task, essentially, is to rekindle this awareness by getting the language acquisition machinery started again.

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THE PSYCHOLINGUISTIC BASIS OF COGNITIVE CLARITY

Writing or print can be said to be visible language. This visible language has developed features that are rather different from those of spoken language. These differences have lead to theoretical controversy about the relations between speech and writing, and to dissension among reading methods experts as to whether or not children should be taught *about* language as part of reading instruction. This paper proposes a theoretical resolution of these conflicts.

MATHETIC FUNCTIONS OF SPEECH

Halliday (1975) has described how the very beginnings of spoken language come from the child's problem solving behavior to serve evolving needs and developmental tasks. The child learns the language of the community as a by-product of striving for these other goals. Grammar is not learned by some mysterious instinctive process, as Chomsky seems to believe. Grammar, in Halliday's view, is acquired because it is a functional necessity for the child. Grammar increases the child's scope of communication in controlling the environment.

But according to Halliday, there are two functions of speech — "pragmatic" and "mathetic". The pragmatic functions are the intrusive, interactive and manipulative aspects of speech. The mathetic functions consist in declarative and observational utterances that occur when the child attempts to understand the self and the surrounding world. These mathetic functions lead the child to become aware of language itself.

Halliday's "mathetic functions" would seem to be the foundation of what Mattingly calls "linguistic awareness". Mattingly (1972) writes that reading is "a deliberately acquired, language-based skill, dependent upon the speaker/hearer's awareness of certain aspects of primary linguistic activity" (p. 145). The aspects that Mattingly refers to are indicated by another quotation: "By virtue of this awarenes, he has an internal image of the utterance, and this image probably owes more to the phonological level than to any other level" (p. 140).

Thus reading is an extension of speech, though, as Mattingly makes clear, reading is not a parallel activity to listening. In Halliday's terms, literacy extends the scope of the pragmatic functions of speech and learning how to read and write are a natural extension of the mathetic functions as children increase their own awareness and understanding of the functions and features of language.

THE INVENTION OF WRITING

The mathetic functions of language and linguistic awareness were the psycholinguistic foundations for the creative thinking that led to the inventions of writing that occurred independently in various cultures. The philologists Gelb (1963) and Jensen (1970) have traced the prehistory and history of the creation of the alternative methods of writing language and it is clear that the inventors and developers of visible signs for language did so on the basis of two sets of ideas. Firstly, they had ideas about the purposes of spoken language. They developed concepts of communication. They then took the leap forward of realizing that the auditory symbols of speech could be translated into visible signs. When this idea was grasped a second set of ideas developed. A way had to be found to analyze speech so that it could be represented by visible signs in an economic code. Different people have different ideas about how to analyze speech. Thus today there exist many different ways to write language. Nevertheless, despite this great variety of writing systems, all visible language rests on these two basic kinds of concepts discovered by the originators of writing:

(1) *Functional concepts:* the communication purposes of writing.

(2) *Featural concepts:* the features of spoken language that were to be represented by written signs.

THE LEARNING-TO-READ PROCESS

Reading normally is the skill of interpreting visible symbols to find out the meaning intended by the author who wrote them. Learning to read involves more than interpreting the author's intentions. The beginner must, in addition, comprehend the intended significance of the symbols that code the author's communication.

Actually this task of the reading novice is not different from the learner's problem in acquiring other types of skills. Fitts (1962) found that all skills pass through an initial cognitive phase in which the beginner tries to comprehend what he must do and why. Bruner (1971) describes how this understanding of the task functions in improving a skill: "There is a very crucial matter about acquiring a skill — be it chess, political savvy, biology, or skiing. The goal must be plain; one must have a sense of where one is trying to get to in any given instance of activity. For the exercise of skill is governed by an intention and feedback on the relation between what one has intended and what one has achieved thus far — 'Knowledge or results'. Without it, the generativeness of skilled operations is lost" (pp. 113-114).

Vernon (1971) has applied the psychology of skill acquisition to reading instruction itself. She writes (in regard to English): "It would seem that in learning to read it is essential for the child to *realize and understand* the fundamental generalization that in alphabetic writing all words are represented by combinations of a limited number of visual symbols. Thus it is possible to present a very large vocabulary of spoken words in an economical manner which requires the memorizing of a comparatively small number of printed symbols and their associated sounds. But a thorough grasp of this principle necessitates a fairly advanced stage of conceptual reasoning, since this type of organization differs fundamentally from any previously encountered by children in their normal environment" (p. 79, italics added). Vernon specifically rejects simple associationistic views of learning to decode. She states: "The employment of reasoning is almost certainly involved in understanding the variable associations between printed and sounded letters. It

291

might appear that certain writers suppose that these associations may be acquired through rote learning. But even if this is possible with very simple letterphoneme associations, the more complex associations and the correct application of the rules of spelling *necessitate intelligent comprehension*" (p. 82, italics added).

In another book, her survey of research on reading failure led Vernon (1957) to conclude that "the fundamental and basic characteristic of reading disability appears to be cognitive confusion . . ." (p. 71) and that "the fundamental trouble appears to be a failure in development of this reasoning process" (p. 48).

If cognitive confusion is the fundamental characteristic of reading failure, then the fundamental characteristic of reading success would seem to be congitive clarity. Why exactly must children be cognitively clear about in learning to read? What do they need to understand in reasoning about the tasks they must undertake in reading instruction?

Reid's (1966) research discovered that young children's conceptions of reading and writing were very different from those of adults. Her Scottish five-year-olds showed a "general lack of any specific expectancies of what reading was going to be like, of what the activity consisted in, of the purpose and use of it." They also had "a great poverty of linguistic equipment to deal with the new experiences, calling letters 'numbers' and words 'names'," and so on (p. 58). That Reid's findings were not limited to the twelve Edinburg pupils that she interviewed has been shown by subsequent studies in several other countries, for example, those of Turnbull (1970) in Australia, Downing and Oliver (1973-74) and Downing, Ollila and Oliver (1975, 1977) in Canada, Downing (1970, 1971-72), Francis (1973) and Hall (1976) in England, Clay (1972) in New Zealand, Lundberg and Tornéus (1978) in Sweden, and Evans (1974), Evans, Taylor and Blum (1977), Holden and MacGinitie (1972), Johns (1977), Kingston, Weaver and Figa (1972), Meltzer and Herse (1969) and Papandropoulou and Sinclair (1974) in the United States. From these studies it seems clear that it is normal for most beginners to enter the task of learning to read in a state of cognitive confusion about the characteristics and purposes of reading activities.

The author and his colleagues (Downing, Ayers, and Schaefer, 1978) recently completed a study in which a structured interview was conducted individually with 310 Canadian kindergarten children selected as a representative sample of pupils in their community. The interview had four parts: I Recognition of acts of reading and writing; II Concepts of the purposes of reading and writing; III Concepts of features of printed materials; IV Visual perception (similar to one part of the Frostig Test). Most children achieved new perfect scores on Part IV. Part I was slightly more difficult. Part II was considerably more difficult and Part III was the most difficult of all. It was concluded that teachers should be more concerned about the development of these metalinguistic concepts than visual perception.

THE COGNITIVE CLARITY THEORY

Reading is a skill and, as Bruner has pointed out, practice in learning any skill requires that the learner understands its objectives. These objectives remain the same today as they were hundreds or even thousands of years

292

ago. The literacy learner has to understand the intentions of writers. Why do they make those visible symbols? The answer has two parts: (1) they intend to communicate some meaning; (2) they intend to code certain features of speech. In other words, beginners have to rediscover those same basic functional and featural concepts that led to the invention of the writing system used in their language.

All the work that has been very briefly reviewed in this paper is reported in detail in *Reading and Reasoning* (Downing, 1979). These studies have led to the proposal of the "cognitive clarity theory of reading," which is summarized in that book briefly in eight postulates:

> (1) Writing or print in any language is a visible code for those aspects of speech that were accessible to the linguistic awareness of the creators of that code or writing system; (2) this linguistic awareness of the creators of a writing system included simultaneous awareness of the communicative function of language and certain features of spoken language that are accessible to the speaker-hearer for logical analysis; (3) the learning-to-read process consists in the rediscovery of (a) the functions and (b) the coding rules of the writing system; (4) their rediscovery depends on the learner's linguistic awareness of the same feature of communication and language as were accessible to the creators of the writing system; (5) children approach the tasks of reading instruction in a normal state of cognitive confusion about the purposes and technical features of language; (6) under reasonably good conditions, children work themselves out of the initial state of cognitive confusion into increasing cognitive clarity about the functions and features of language; (7) although the initial stage of literacy acquisition is the most vital one, cognitive confusion continues to arise and then, in turn, give way to cognitive clarity throughout the later stages of education as new subskills are added to the student's repertory; (8) the cognitive clarity theory applies to all languages and writing systems. The communication aspect is universal, but the technical coding rules differ from one language to another (pp. 53-54).

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294

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THE SYNTAGMATIC-PARADIGMATIC SHIFT WORD ASSOCIATIONS AND LEARNING TO READ

Mattingly's (1978) concept of linguistic awareness is provocative to those interested in reading behavior. It may be that certain aspects of the concept can be tested by some of the long familiar techniques used to investigate language and cognition. Word association responses, for example, have been studied for nearly a century as a means of exploring cognitive schemata, memory, emotional states, and more recently linguistic structures (Esper, 1970). One method employed in analyzing responses to stimulus words has been by determining if the response word is paradigmatic or syntagmatic. The syntagmatic-paradigmatic categorization is based upon the distinction that stimulus words employed in free association tasks tend to elicit responses that are either from the same grammatical form class, (i.e., paradigmatic) or from a form class that is likely to be contiguous in a syntactic sequence (i.e., syntagmatic). For example, a response to the stimulus word *open* of *close* is regarded as paradigmatic while a response such as *road* to the same stimulus word would be categorized as a syntagmatic response. Paradigmatic responses include coordinates such as table — chair, opposites such as dark —light; hard — soft; synonyms as cold — frigid; warm — hot; or superordinate responses such as table — furniture. Syntagmatic responses in free association tasks are thought to be more heterogeneous and seem to reflect the influence of syntax in associations, e.g., table — eat, dark — night, cold — day.

During the last decade considerable attention has been focused on the syntagmatic-paradigmatic shift in children. The syntagmatic-paradigmatic shift refers to the observed fact young children tend to respond syntagmatically to stimuli words while older children and adults tend to give predominantly paradigmatic responses. Between the ages of five and nine years there generally tends to be a shift in the preponderance of syntagmatic responses in favor of an increased number of paradigmatic, or more adult-like responses. It is this syntagmatic-paradigmatic shift that has intrigued many theorists and researchers.

Most of the studies involving the S/P shift have been conducted by psycholinguists or child psychologists interested in language acquisition or cognitive development. Their research has raised many provocative questions, but as yet no single acceptable theory concerning the S/P shift has emerged. It is likely that the shift in word associations may reflect changes in linguistic structures, increased cognitive complexities or even a greater vocabulary. Although the basic reasons for the shift are not known at present, all theorists recognize the intimate relationship which exists between language and cognition. An in-depth discussion of the current theories and research on the S/P shift is outside the realm of this paper. Those interested in further information are referred to the recent excellent review by Nelson (1977).

It should be of major interest to those primarily interested in reading, that repeated research has demonstrated that the shift from predominantly syntagmatic responses to predominantly paradigmatic responses typically takes place between the ages of five and nine years. These are, of course, the years when the child is introduced to formal schooling. The kindergarten and primary grades are the years when the child is exposed to intensive reading readiness activities and to systematic formal reading instruction. Despite these obvious relationships few researchers have systematically explored the impact of schooling on the syntagmatic-paradigmatic shift as shown by an examination of the sources cited by Nelson (1977).

A few studies have been conducted, however, by researchers primarily interested in school achievement. These, however, typically have not dealt with the syntagmatic-paradigmatic shift *per se* but rather have attempted to explore the relationship of paradigmatic response modes to order variables. Propensites for paradigmatic responses in older children have been shown to be positively related to vocabulary, intelligence and school achievement by a number of studies (Bickley, Bickley, Cowart, 1971; McNinch, Richmond & Hornsby, 1971; Brosier, 1974; Bickley, Dinnan, Jones, 1971).

In a study that merited more attention that it has received, Bickley (1969) sought to determine how rapidly beginning first graders learned words presented to them. Two categories of words were employed. The first consisted of words which previous research had shown to have high associative connections for children, i.e., syntagmatic associations. The second list were words having logical or associative congruence, i.e., paradigmatic associates. Bickley found the type of association to be more important than the frequency of the word in common usage, and that paradigmatic (Bickley used the term logical relationships) associates required a greater number of trials to learn. Bickley concluded:

> The difference in adult and children's associates then is not considered to be a trivial difference. The fact that children learn words presented in a syntagmatically associated test more rapidly than they learn words presented in a paradigmatically associated list implies that underlying the child's categorization is a lack of semantic organizational depth. This has many implications for the construction of children's learning materials which are to be sequenced according to the child's abilities and understanding. It also has implications for the construction of evaluation instruments which ought to be designated with the same considerations in mind. (Bickley, 1969, p. 3)

The fact that by the age of six some children already have shifted from predominant syntagmatic responses while others have not probably points to a need for different types of materials for eliciting associations and related mental processes.

Currently it is a cliché that "reading is a thought process." Actually most basal reading programs presume to train beginning readers in comprehension. Although comprehension has been criticized as a vague and "Humpty Dumpty" word (Kingston, 1961, 1962), most educators recognize that meaning is an integral part of comprehension. One aspect of meaning must be the number of associates an individual possesses in relation to a particular stimulus item or word. The child whose associations seem to be more constrained by syntactic associates undoubtedly will have more difficulty in comprehending than does the child with semantic (or paradigmatic) as well as syntactic associates. This is especially true if comprehension is to include all of the higher level of mental processes traditionally aspired to *viz* reflection, critical evaluation, imagination, judgment, reasoning, etc. (Gray, 1937; Gates, 1949). As paradigmatic responses include coordinates, superordinates, opposites and synonyms responses of this type undoubtedly reflect higher level cognitive functioning and richer language than do responses constrained by syntax. It is, of course, extremely difficult to demonstrate empirically the uniqueness of verbal abilities as contrasted with measures of cognition and intelligence.

One further complexity in studying the S/P shift as it pertains to beginning reading should be noted. Numerous recent investigations have shown that beginning readers are uncertain about the nature of reading behavior and the nature of the "word" as a unit language (Reid, 1966; Meltzer & Herse, 1969; Kingston, Waver & Figa, 1972; Downing & Oliver, 1974). The lack of concern or precise information concerning the concept "word" in ordinary language may be related to the S/P shift in ways not suspected previously. Perhaps the associations of any word when presented in sentence form naturally become constrained by its placement in the sentence. When the child is introduced to formal reading instruction the word as a separate entity becomes significant at that time. As he focuses on "words" as units perhaps such concentration accelerates the semantic or paradigmatic associations observed. The S/P shift for some children may be due in large part to training in reading. The fact that the S/P shift occurs during the period that children are exposed to systematic reading instruction stresses a need for further study of the phenomenon by reading educators. Normative studies of adequate representative samples of children of various geographic areas, ethnic and socioeconomic status might yield pairs of free associates that could be used in reading sight words and word recognition skills to first graders. Such studies also might be of value in teaching comprehension. It also might be fruitful to determine if the S/P shift can be accelerated in certain children and if such acceleration would have beneficial outcomes in school achievement. Cartelli (1976) and Dinnan, Sullivan and Cartelli (1978) found that systematic instruction in certain paradigmatic associations aided children with "learning disabilities." Routh and Tweney (1972) found that systematic training of kindergarten and fifth graders resulted in only slight increases in paradigmatic responding to verbs and adjectives from both groups but a slight decrease in noun responses given to noun stimulus words by the kindergarten children.

One possible explanation of the propensity for syntagmatic responses to stimulus words in young children is that they have learned much of their language in limited experiential situations. Tulving (1972) distinguishes between "episodic" and "semantic" memory. Episodic memory is concerned with the storage and retrieval of temporally dated, specially located and personally experienced events, while semantic memory is concerned with more generalized information about words and concepts (Tulving & Thompson, 1973). If one accepts Tulving's dichotomy as a working approach it seems likely that syntagmatic responses may tap episodic memory while paradigmatic responses may be limited from the semantic storage and retrieval system. Two important considerations for reading instruction need to be made. First because it is obvious that for many primary grade children episodic memories are paramount, it would seem reasonable to develop instructional materials that are formulated on syntagmatic associations and ease of learning rather than on the present materials based on words of high frequency taught in story form. Secondly, it is generally recognized that learning to read is unlike ordinary language development. In reading instruction the child is suddenly presented with intensive systematic, massive learning situations in which natural reinforcers may not be readily available and for which the child may be poorly motivated (Staats & Staats, 1962).

It would seem to follow that reading instruction *per se* plays some role in facilitating the S/P shift. In learning to read the child is exposed constantly to vicarious experiences, class discussions designed to elaborate upon incidents depicted, and questioning and cueing, which leads to inference and generalization. Such intensive, systematic, and constant experiences, from a viewpoint of logic, would appear to lead to the development of semantic meanings and associations. We have evidence that reading lessons lead to vocabulary extension and development.

Finally, if one accepts the premise that associations play an essential, or even a significant, role in cognition, and if we really believe that reading is a thought process, it would appear that those interested in the psychology or pedagogy of reading should be interested in a systematic investigation of the S/P shift. The development of lexicons of associations for diverse population groups might prove helpful. The development of materials using paired associates or serial lists of words might prove fruitful in bridging the gap between present teaching methods and the findings of traditional verbal learning experiments. Experiments to provide greater insight into the S/P phenomenon with a view of further understanding the phenomenon also are needed. Certainly many other possibilities exist which should titilate the imagination of reading researchers. Systematic investigations of such associations by educators might lead to the improvement of primary grade instruction and also might provide further significant insights concerning the relationship of reading to thinking and of aural language to reading as well as to the processes by which connections and the long-term memory of associates are made.

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PHONOLOGICAL CODING IN BEGINNING READING

A word in a spoken language has two essential properties. It has a meaning or meanings, and it has a phonological form. Neither a meaningless label nor an unencoded meaning can be a word of any language.

As many investigators have pointed out, written languages are parasitic on spoken ones. Thus, the patterning of symbols in written text makes reference to some corresponding patterning in a spoken language. In alphabetic writing systems, the primary correspondence is with the meaningless sound elements of the spoken language.

Since words of a language have essential phonological as well as semantic properties, when a reader recognizes a written symbol or symbol string as a referent of a word in his language he achieves access both to the semantic and to the phonological properties constituting the word. Consequently, it may be useless to debate *whether or not* phonological information is accessed during reading (i.e. whether reading can be a "purely visual" process).

On the other hand, it may be useful to ask what *role* phonological information serves in reading. For readers of an alphabetic orthography at least two roles are possible. Of them, one is probably essential, while the other may be optional at least for skilled readers.

The essential function is to provide a convenient form for the short-term storage of textual material while it is being read. In a grammar that allows embedding, close grammatical relationships may obtain between words that are quite far apart in a sentence (e.g. "The *woman* who lives next door *writes* a column in the local newspaper"). On these grounds it has been argued that substantial portions of a sentence must be held in storage until a whole syntactic chunk is available for semantic processing. The memory system that is believed to have the requisite capacity and longevity for this purpose is phonological short-term memory.

Similarly, writers as well as talkers use pronouns in the place of common or proper nouns, but only when they can assume that the reader or listener is currently "thinking about" the pronoun's referent (e.g. Chafe, 1974). Thus, the sentence pair in 1 is natural, while that in 2 is not:

1. John broke the expensive vase. He tripped over it on his way out the door.
2. John broke the expensive vase. John tripped over the expensive vase on John's way out the door.

But pronominalization is only feasible if the reader or listener keeps old information (i.e. the information given in the first sentence of each pair) "in mind" as he processes new information. Again the likely means of keeping old textual information available is phonological short-term memory.

These considerations are supported by data from several sources. For example, skilled readers of English persist in phonological access during reading of text even when doing so impairs performance on a second task (Corcoran, 1966). Moreover, preventing phonological access during reading impairs memory for meaning (Levy, 1975). Finally, skilled readers of a logographic orthography (Chinese) code written text phonologically when their task is to read for meaning (Tzeng, Hung & Wang, 1977). These studies suggest that eventual access to phonological information (before, or at the time of lexical access) may be an invariant aspect of skilled reading across orthographies and across reading tasks that require short-term memory.

Beyond providing a convenient temporary storage medium, however, phonological information may be involved in the reading process in a second way as well. Readers of an alphabetic orthography may access the lexicon by applying spelling-to-sound rules to a written word in order to extract its corresponding phonological form. The phonological information may then serve as it does in listening as the "address" for the appropriate lexical entry. Baron and Strawson (1976) provide evidence that some skilled readers tend to use this means of word identification. Of course, the skilled reader *need* not access the lexicon in this way. Baron and Strawson (1976) also provide evidence that other readers habitually access the lexicon based on a word's orthographic form.

THE BEGINNING READER: THE POSSIBILITY OF FLEXIBLE PROCESSING STRATEGIES

But what of the *beginning* reader of an alphabetic orthography? What role does phonological coding serve in the beginner's efforts to read, and what role should it serve? On the one hand, the requirements of short-term memory are as critical to him as they are to the skilled reader. But what of its role in reading isolated words? Should the child exploit the sound-based patterning of the orthography in his reading of single words, or should he bypass it as some skilled readers tend to do, and as readers of logographic writing system apparently must do?

A moment's consideration suggests that he sould be *capable* of doing both. Each processing style has its special advantages and disadvantages that may suit it best for different kinds of words or for different situations in which words are to be identified.

Consider first the strategy in which lexical access is based on a word's holistic optical form, and thus in which the sound-based patterning of the orthography is irrelevant to the reading task. Some words, namely those that do not conform to English spelling-to-sound rules, must be read in this way. Moreover, an advantage of this strategy for the child may be that his reading can be more fluent than it is when he stops to sound out each word. On the other hand, at the very earliest stages of learning to read, this strategy places an enormous burden on the child's ability to rote memorize word shapes, and on his ability to make intelligent guesses based on context when he sees an unfamiliar word.

For its part, the second strategy — of accessing the lexicon based on the phonological form of a word — also has important advantages and disadvantages. Its main advantage is that it exploits the more or less lawful relationship between orthography and sound. Thereby it enables the child to read most of the words that he knows by sound but not yet by sight.

As important as this advantage is, it is countered somewhat by two apparent disadvantages. One is that for an unpracticed reader, application of sound-spelling rules is time consuming. Thus, reading may not be fluent, and the child may have difficulty remembering words that he has already read as he is confronted with the "interfering" task of word decoding. The second disadvantage is that this strategy requires what Mattingly calls "linguistic awareness", and similarly it requires that the child understand the relationship between aspects of the language and of the orthography. Thus, it requires that the reader be *aware* that words, both written and spoken have an internal structure, and that the internal structure of the one refers to (provides information about) the internal structure of the other. Recent research makes it quite clear that information about the sound structure of a spoken word or syllable is not readily available to the nonreader's awareness (Liberman, Shankweiler, Fischer & Carter, 1974). Rather the child has to learn explicitly what he already knows tacitly — namely that words are sequences of phonological segments. This is the problem of linguistic awareness. In addition, is the related problem of understanding the relationship between analogous characteristics of written and spoken words. Even seemingly obvious relationships are not obvious to the young child. For example, he may not know that orthographic length is correlated with spoken duration (Rozin, Bressman & Taft, 1974).

The foregoing considerations of the advantages and disadvantages of the two reading strategies suggest that an optimal approach to reading for a child is one in which he uses both means of lexical access but in either case, stores the outcome in phonological short-term storage. If he can recognize a word on sight, then that may be the most efficient means of access to the lexicon. Failing that, however, it is important that he have a reliable way to identify a word. The most reliable way, given the nature of the orthography, is the strategy of exploiting the lawful relationships between the atomic units of the orthography and those of the language.

RESEARCH ASSESSING THE PROCESSING STYLES OF BEGINNING READERS

My colleagues and I have examined the role of phonological coding in beginning reading, both in respect to its role in the short-term storage of vergal information (Liberman, Shankweiler, Liberman, Fowler & Fischer, 1977) including text (Fowler, in preparation; Mann, Liberman, Shankweiler & Katz, in preparation) and in respect to its role in lexical access (Fowler, Liberman & Shankweiler, 1977; Mark, Shankweiler, Liberman & Fowler, 1977). We have tried to assess the importance of this linguistic aspect of reading for the beginner by comparing the effectiveness with which a reader accesses and uses phonological information to his degree of reading skill. We have devoted less effort to the visual component of the reading process primarily because the available evidence suggests that it is not a problematic aspect of learning to read even among most poor readers (e.g. Liberman & Shankweiler, in press; Vellutino, 1977). Three of the areas in which my colleagues and I have studied phonological processing in beginning reading are briefly summarized below.

302

PHONOLOGICAL CODING IN READING TEXT

In any reading task that involves short-term memory — either explicity or by implication in requiring comprehension of text — we should find that the beginning reader encodes the textual material phonologically. Moreover, given that good and poor readers do not differ strikingly on *nonlinguistic* aspects of the reading task, we would expect to find the differences among them to show up in the extent to which they make efficient use of the phonological representation in their reading of text.

Two results obtained by our research group bear out these predictions. In one experiment (Fowler, in preparation), second grade good and poor readers were given two tasks to be performed concurrently. They were asked to read a short passage for comprehension and at the same time to cancel out any letters "e" that they saw while reading. This task was modeled after Corcoran's original experiment designed to assess phonological coding by adult readers. He found that silent e's were missed more often than nonsilent e's and suggested that this difference could only arise if the subjects were coding the written words into some sound-based form. Our study replicated Corcoran's in showing a higher proportion of silent e's being missed by both groups of readers than nonsilent e's. In this study, although good readers tended to show a larger silent e effect than poor readers, the difference did not approach significance.

However, in a study of immediate recall of sentences, Mann, Liberman, Shankweiler & Katz (personal communication) did obtain the expected difference between good and poor readers. In this study, good readers were substantially more impaired than were poor readers by phonological confusability among the component words of a sentence.

LINGUISTIC AWARENESS AND BEGINNING READING SKILL

Beyond the role of the phonology in comprehension and storage of text, we have suggested that phonological information may also be invoked by application of spelling-to-sound rules when individual words are read. This use of the sound-patterning of the language, as we have noted, demands "linguistic awareness" on the part of the reader. Thus we would expect to find a relationship between a child's degree of linguistic awareness and his ability to read isolated words. Several studies have obtained a significant correlation between a subject's performance on Liberman's phoneme segmentation task, designed to measure linguistic awareness, and performance on the *Wide Range Achievement Test,* which assesses skill in reading isolated words (Helfgott, 1976; Zifcak, 1977). Thus, subjects who perform more poorly when asked to indicated the number of phonemic segments in a word by tapping once per segment, also rank lowest on a test of isolated-word reading.

PHONOLOGICAL CODING IN THE READING OF ISOLATED WORDS BY GOOD AND POOR READERS

If more and less skilled readers are distinguished either in the extent to which they use the phonological coding strategy of lexical access, or in the

303

success with which they use it, the coding component in isolated-word reading might be expected to be more salient among good than among poor readers, and more salient among experienced than among less experienced readers.

A difference between good and poor readers was found in an experiment by Mark, Shankweiler, Liberman and Fowler (1977). In that study, second grade good and poor readers were given a list of words to read aloud. Following that, unexepectedly, they were given a recognition task including the words that they had just read and a set of rhyming and nonrhyming foils. Good but not poor readers made significantly more false positive responses to rhyming foils than to nonrhyming foils.

An investigation of the development of phonological coding skills provides compatible data (Fowler, Shankweiler, & Liberman, 1978) in showing a relationship between skill in accessing the phonological form of a letter string and reading experience. This study showed an increase in tendency to apply spelling-to-sound rules appropriately to nonsense letter-strings with increasing reading experience among second, third and fourth grade children.

SUMMARY

The literature on skilled reading suggests two ways in which speech coding contributes to the skilled reading process. On the one hand, phonological short-term memory facilitates the comprehension of text, and on the other hand, the phonological form of a written word may serve as the word's lexical address. Both of these services are at least as critical to the beginner as they are to the skilled reader. Our research concerning the correlates of beginning reading attests to this in showing that good and poor beginning readers, and likewise, less and more experienced readers are distinguished on measures of linguistic awareness and on several other indicants of facility with speech coding.

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DISCUSSION: LINGUISTIC AWARENESS AND COGNITIVE CLARITY IN LEARNING TO READ

Dr. Mattingly's term "linguistic awareness" and Dr. Downing's term "cognitive clarity" are closely related and it is difficult to draw a sharp line of distinction between them. They seem to share certain ideas, such as: that a spoken utterance consists of separate words; that the meaning of the utterance depends on both the meanings of the individual words and their sequential arrangement; that a spoken word can be segmented into a sequence of words; that print symbolizes the sounds of spoken language; that the sequence of printed words corresponds one-to-one with the sequence of spoken words; and that a printed word contains letters which represent the sequence of sounds in the spoken word.

Those who prefer "linguistic awareness" seem to have concentrated on segmentation of sentences into words and words into sounds as of primary importance. Those who have preferred "cognitive clarity" have emphasized the importance of the child's understanding of the concepts of word, sound, and letter. There are other understandings which can be subsumed under either term, such as that printed words are arranged in left to right sequence in a line, and line by line progressively down the page. And there are words used often by teachers which the child must understand: words like page, sentence, line, first, middle, last, before, above, after, below.

Both Dr. Mattingly and Dr. Downing emphasize that reading does not involve only the formation of association between printed and spoken words, and letter-sound associations; the child has to learn many interrelated concepts about spoken and written language, if he is to read meaningfully.

Dr. Fowler's term "phonological coding" caused me some difficulty until I translated it into word pronunciation, overt or covert. The work of the Haskins Laboratory group to which she belongs has cast much light on the relation of various aspects of linguistic awareness to learning to read, much of which has been mentioned in her paper. Dr. Fowler seems to equate linguistic awareness with understanding that spoken words are sequences of phonological segments. Her point, that in reading pronouncing the words out loud or to oneself provides a handle by which word concepts can be held in short-term memory until they can be integrated to produce a sentence meaning, is an important idea.

Dr. Kingston has called attention to the shift in free word associations from syntagmatic to paradigmatic, or as they might be more simply labeled, from personal to logical. This shift takes place during the period when children are learning to read. This is also the period during which Piaget finds children to be gradually acquiring concepts of conservation, and developing logical reasoning at a concrete level.

Success in learning to read is undoubtedly correlated with this shift in associative tendency. It is also related to development of conservation, to increasing mental age, to vocabulary growth, and to a host of other cognitive variables, nearly all of which are positively intercorrelated. Whether the syntagmatic-paradigmatic shift has any special significance for reading

306

instruction is not known, and Dr. Kingston's proposal that this is an appropriate area for future research is reasonable. In regard to the specific question of using high-frequency associations to select words for early reading instruction, much caution would seem desirable. A good case can be made for using either a frequency-based sequence for introducing words, or a sequence based on the relevance of the words to a specific sequence of decoding principles. It will be hard to convince those who construct beginning reading materials that a third alternative is better.

Little has been said this afternoon about the effect of instruction in the development of linguistic awareness and cognitive clarity. Ehri (1975) gave several tests of word consciousness to prekindergarten, kindergarten, and first grade children near the end of the school year. The first graders did much better than the prereaders, but there was no difference between the kindergarteners and the prekindergarteners. The implication is that instruction made the difference. Tomlinson (1977) found that there was significant growth in understanding of basic reading concepts between September and December of the first grade. Individual differences were also important. There were positive correlations between children's understanding of reading concepts prior to instruction, their IQ's, and their progress in learning to read.

Research on how best to help children to develop linguistic awareness and cognitive clarity is obviously needed. McDonnell and Osburn (1978) state that attempts to isolate and teach specific concepts about language and reading are less effective than a global approach to which children are immersed in a rich language environment that includes much reading, choral reading, dramatic reading, assisted reading, and so forth. This question could be a vital one for research in the near future.

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PAPERS PRESENTED AT THE 1978 MEETING OF THE NATIONAL READING CONFERENCE IN ST. PETERSBURG

For the convenience of NRC members who may wish to write directly for papers, we are listing all papers presented at the St. Petersburg conference. We have systematically excluded program chairpersons, discussants, respondents, etc. Also we have tried to make all changes in paper authorship and titles, however it is likely that there still exist some discrepancies.

1.0 Philip Gough, University of Texas, Austin. Words and Letters.

2.1 Irene H. Blum and Nancy E. Taylor, The Catholic University of America. Children's Developing Notions of Word Boundaries.

2.2 Nelly M. Hecker, University of Georgia. Word Boundaries as Related to Reading Skill Performance.

2.3 George McNinch and Mark G. Richmond, University of Southern Mississippi. Related Experiments in the Recognition of Aural Word Boundaries.

2.4 Kathleen Gormley and Jane Domaracki, SUNY, Albany. Coding Preferences of Good and Poor Readers on High Frequency-Low Discriminability Words.

2.5 Lauren Leslie, Marquette University. Oral Reading Accuracy: A Determinant of Reading Strategies?

3.1 Gilbert Schiffman USOE/Right to Read. The USOE Basic Skills Task Force.

3.2 Thomas Sticht, National Institute of Education. A Developmental Model of the Basic Skills.

4.1 Judith A. Boettcher, University of Minnesota. A Base Study of Word Assignation Strategies of Skilled Adult Readers.

4.2 Judy A. Schwenker, University of Wisconsin. Decoding Strategies of Adult Basic Education Students.

4.3 Judy S. Richardson, Georgia State University. Some Factors of Adult Psychology Related to Success of Adult Beginning Readers.

4.4 Mary McMurray, James Madison University; Ray Morgan, Old Dominion University; James L. Laffey, James Madison University. College Students' Word Identification Strategies.

4.5 Janet J. Larsen, University of Florida; Chester E. Tillman, University of Florida; Robert Millott, Dept. of Health and Rehabilitation Services, State of Florida. Can We Outgrow "Dyslexia"?

5.1 Peter McDermott and Anne McGill-Franzen, SUNY, Albany. Negotiating a Reading Disability.

5.2 Robert L. Aaron, University of Georgia and Ron Rood, Allendale County Schools, SC. Reinforcement Scheduling as a Function of Teacher and Pupil Race.

5.3 Marie Carducci-Bolchazy, SUNY, Albany. Differences in Content and Mode of Instruction Among Reading Groups.

6.0 Bonnie J. F. Meyer, Arizona State University, Organizational Patterns in Prose and Their Use in Reading.

7.1 Michael C. McKenna and John W. Miller, Wichita State University. Developmental Trends in the Relative Effects of Intelligence and Perception on Reading.

7.2 Roger A. Johnson and Betty H. Yarborough, Old Dominion University. Sex Differences in Intellectual Functioning, Reading/Language Arts Achievement, and Affective Development During the First Six Years of Elementary Schooling.

7.3 Mary Lorton, Aquinas College and Cristopher Kukuk, University of Missouri, Kansas City. Does the WISC Really Predict Reading Peformance?

7.4 Phyllis Coulter, Linda Hess, Plains Elem. School, Rockingham County Schools; James L. Laffey, James Madison University. Early Intervention in Preventing Problems — Can it Make a Difference?

8.1 Sheilah Allen, University of Lethbridge, Alberta. Results of a Field-test of a Needs-Assessment Instrument in Secondary Reading.

8.2 Jill Edwards Olshavsky, Indiana University. An Investigation of the Relationship Between Reading Beliefs and Reading Ability.

8.3 Robert L. Curry, University of Oklahoma and Judith M. Billen, Oklahoma City Schools. Effects of Attitudes on Reading Achievement of Students in an Innovative High School.

8.4 Charles W. Peters, Oakland Schools, Pontiac, Michigan. Determining Reading Performance Through Student Self Assessment.

9.1 Martha Dillner, University of Houston at Clear Lake City. The Reading and Study Skills for Medical Students on Medically Related Materials.

9.2 Joseph L. Vaughan, Jr., Paula L. Stillman and Darrell L. Sabers, University of Arizona. Effect of Using Componential Analysis During Reading on Reading Comprehension of Medical Students.
9.3 Judith W. Irwin, Purdue University and Pauline L. Witte, University of Wisconsin-Madison. College Readers' Mental Imagery, Comprehension, and Attitude with Abstract and Concrete Expository Materials.
9.4 Stephen P. O'Neill, Bronx Community College, City University of New York. Reading Methods for ESL College Students.
10.1 Mary Ann Geissal and June Knafle, Northeastern Illinois University. The Effects of Miscue Analysis Instruction on Judgments of Seriousness of Oral Reading Errors.
10.2 Wanda Gale Breedlove and Frances S. O'Tuel, University of South Carolina. Effectiveness of Teaching Reading Methods to Teachers Via Closed-Circuit Television.
10.3 Sharon D. Smith, Douglas County, Georgia, Schools. The Effectiveness of Two Modules Training Teachers to Ask Questions.
10.4 Hal W. Seaton, University of Georgia. A Study of The Effectiveness of Traditional and Competency-Based Instruction in Reading Methods with Pre-service Teachers.
11.0 Andrew Ortony, National Center for the Study of Reading, University of Illinois. Comprehension of Figurative Language.
12.1 Emilie Paul Sullivan, University of Arkansas. The Teaching of Reading in the Kindergarten: State of the Art Review.
12.2 Eunice L. Schmidt, Seattle Pacific University. Linguistic Awareness in Kindergarten Children.
12.3 M. Jean Greenlaw, North Texas State University and David Moore, University of Georgia. A Meta-Analysis of Beginning Reading Readiness Research.
12.4 R. Ann Zinck, University of Nebraska-Omaha. Language Concepts and Language Complexity as Factors in Development of Reading Readiness.
13.1 Robert L. Aaron and Hal W. Seaton. The Relationship of Mental Age to Rate for Learning Words.
13.2 Glen Powell, and Ann Hall, University of Georgia. The Effects of Word Imagery Upon Sight Word Learning Rate.
13.3 David Moore, University of Georgia. Reading Readiness Test Scores and Amount of Instruction as Predictors of Sight Word Mastery for Kindergarten Students.
14.1 Martha Tips, Eugene A. Jongsma and Ron Pound, Southern Methodist University. The Effects of Instruction in Verbal-Reasoning Strategies (Analogies) in a College Reading Improvement Course.
14.2 Joseph A. Hawkins, Jr. and Joan C. Bartlett, Howard University. The Relationship between Study Skills Reinforcement and Academic Performance of Underachieving Science Majors.
14.3 Joseph Ilika, Texas A&M and Shirley T. Spencer, Southern University, Shreveport-Bossier City. A Comparison of Demographic Characteristics of High and Low Achievers in Adult Reading Improvement Courses.
14.4 Nancy K. Staley and Thomas Smyth, University of South Carolina-Aiken. An Evaluation of the Effectiveness of a College Reading Program Using Three Criteria.
14.5 Lynna Geis, Oscar Rose Junior College and Myrna L. Carney, University of Oklahoma. Reading Ability, College Grades, and Attrition: A Two-Year Study.
15.1 Catherine Tolsma and Robert D. Chester, University of British Columbia. Reading Inservice Needs-Assessment: What Do Teachers Want?
15.2 Joseph Anthony Muia and Eugene Connors, James Madison University. Clinical Reading Practices: Some Legal Considerations.
15.3 Karl Koenke, University of Illinois. A Professional Library for the Remedial Reading Teacher: A Survey of Expert Opinion.
15.4 Allen Berger and Charlene Andolina, University of Pittsburgh. Are Porgram Changes in Schools Based Upon Exemplary Research Studies Appearing in Educational Publications?
16.0 David Rumelhart, University of California, San Diego. Comprehension of Stories.
17.1 Anne McGill-Franzen and Kathleen A. Gormley, SUNY, Albany. Influence of Context on Deaf Readers' Understanding of Passive Sentences.
17.2 Catherine W. Hatcher, University of Northern Iowa. Reading Skill Development in Hearing Imparied Children.
17.3 Susanna W. Pflaum, University of Illinois at Chicago Circle. Sex and Paper Neatness as Factors in Identifying Disabled Readers.
17.4 Judith Cochran, North Texas State University. Right Hemispheric Readers.

19.1 Ruth J. Kurth, North Texas State University. A Comparison of Small Group and Individualized Instruction in College Remedial Reading Programs.

19.2 Thomas W. Bean, California State University, Northridge; Marcia Stigler, Marlene Hayes, Gilbert Phillips, Western Illinois University. The Influence of a Structured Overview on University Students' Short and Long Term Comprehension.

19.3 Vincent P. Orlando, Pennsylvania State University. Notetaking vs. Note-Having: A comparison While Studying From Text.

19.3 Joyce E. Pederson, College of St. Thomas. An Investigation into the Differences Between Student-Constructed Versus Experimenter-Constructed Post Questions on the Comprehension of Expository Prose.

19.5 Stanley Wanat, California State University, Fullerton and Harry Singer, University of California, Riverside. Comprehension; Teaching College Students Semantics and Syntactic Relationships in Four Content Areas.

20.1 John W. R. Smith and Rose Spicola, Texas Women's University. The Influence of Home Environment on the Development of Language and Concepts About Print.

20.2 Kaaren Perkins, Texas Women's University. Developmental Observations of Kindergarten Children's Understanding in Regard to Concepts about Print, Language Development, and Reading Behavior.

20.3 Dora B. Knox, Edward Fallon, Kathy Scott, SUNY, Albany. Preschool Screening Scores as Indicators of Differential Abilities in Reading Achievement.

20.4 Henry G. Timko, University of Victoria. Effects of Three Visual Discrimination Strategies on the Paired-Associate Learning of Alphabet Letters.

21.0 Mark D. Jackson and James L. McClelland, University of California, San Diego. Components of Reading Ability.

22.1 Oscar Ozete, University of Wisconsin-Madison. Assessing Reading Comprehension in Spanish for Bilingual Children.

22.2 Pat Rigg, Karen Thompson, Elizabeth Taylor, and Elizabeth Berger, SUNY, Albany. Measures of Comprehension.

22.3 Joseph Ilika, Texas A&M University; Rita Martin and Douglas M. Brooks, University of Texas, Arlington. A Model for the Measurement of External Reading Flexibility.

22.4 R. Scott Baldwin and Robert J. Hess, University of Tulsa. The Validity of Gain Scores When Adjacent Levels of a Test Series are Used as Pre' and Posttest Measures.

23.1 Franz J. Frederick, Purdue University. An Introduction to Microcomputers: Potential in Education.

23.2 Ron C. Leslie and N. A. Peters, Oakland Schools Child Study Center. Symbolic Communication Interface for the Multiply-Handicapped.

23.3 Michael L. Kamil and Franz J. Frederick. Using Low-cost Microcomputers to Train Secondary Teachers in Reading.

23.4 Ron C. Leslie and Michael L. Kamil. Microcomputers: A Possible Answer for Needed Research Facilities for Information Processing Research in Reading.

24.1 Carol S. Greenfield and Elliott Lessen, University of Northern Iowa. An Analysis of Pre-Service Teachers' Reading Competence and Attitude Toward Reading.

24.2 Penny J. Nielson, Nicholls State University. Attitude Toward Reading Instruction Among Elementary Teachers.

24.3 Larry L. Mikulecky, Indiana University. Teacher Prediction of Students' Reading Attitudes: An Examination of Teacher Judgment Compared to Student-Peer Judgment in Asessing Student Reading Attitude and Habit.

24.4 Patricia L. Anders and Judy N. Mitchell, University of Arizona. Comparing Pre-Service Teachers' Reading Attitudes, Awareness and Abilities.

25.5 Judy N. Mitchell and Patricia L. Anders, University of Arizona. Comparing Pre- and In-Service Teachers' Reading Attitudes, Awareness and Abilities.

26.1 James Flood and Diane Lapp, Boston University. The Role of Selected Text-Internal Stimulants on Inference.

26.2 Robert Tierney, University of Arizona. Inference Across Text Sets.

26.3 Carol Dixon, University of California, Santa Barbara. Story Type and Children's Recall.

26.4 P. David Pearson, University of Minnesota. Methodological Concerns in Discourse Research.

26.5 Roger Lantaff, University of California, Santa Barbara. The Effects of Prose Structure on the Recall of Fifth Graders and College Students.

26.6 Priscilla Drum, University of California, Santa Barbara, Differences in Literal and Inferred Recall Resulting from Syntactically or Semantically Simplified Passages.

27.1 Don Nix, IBM. A Theory-based System for Teaching Reading Comprehension Skills to Children.

27.2 Molly M. Wilson, University of Georgia. The Effects of Question Type and Placement on the Reading Comprehension of Upper Elementary Students.

27.3 Emery P. Bliesmer, Pennsylvania State University and Lynn S. Orlando, York College. Effects of Different Types of Comprehension Question Training on Comprehension of Good and Poor Readers in Middle Grades.

27.4 Richard L. Isakson, John W. Miller and Michael C. McKenna, Wichita State University. A Treatment Study of Three Instructional Approaches to Reading Comprehension.

28.1 Rosalie M. Bianco and Bob W. Jerrolds, University of Georgia; Sidney E. Benton, North Georgia College. An Analysis of the Syntactic Complexity of Multiple Choice Questions, True-False Questions and a High School Textbook.

28.2 Lana McWilliams and Thomas A. Rakes, Memphis State University. Validation of Informal Group Diagnostic Procedures in Content Areas.

28.3 V. Michael Lahey, Florida A&M University and Janice Smith, Florida State Department of Education. The Florida Functional Literacy Test.

28.4 Cyrus F. Smith, Jr. and Richard D. Western, University of Wisconsin, Milwaukee. Passage Independence and Proficiency: A Case Study.

29.1 Garr Cranney. Aspects of Comprehension: Conceptual Foundations for a Multi-Cultural Adult Literacy Program.

29.3 Sandi H. Amend, Brigham Young University. Three Methods of Measuring Qualitative Differences in Comprehension.

30.1 Dorothy J. Watson and Richard D. Robinson, University of Missouri-Columbia. A Psycholinguistic Investigation of the Reading Process in Older Readers.

30.2 Ellen M. West and Diana L. Lagotic, Alachua County Adult Education Program. The Accuracy of Adult Disabled Reader's Perceptions of Their Own Reading Difficulties.

30.3 Joe Peterson, Kansas State University and Edward Paradis, University of Wyoming. Effects of Passage Length upon Reliability and Consistency of Oral Reading Errors for the Instructional Level of the IRI.

30.4 Evelyn B. Spache, Spache Educational Consultants, Inc. A Resource for Adult Illiterates: Mail Order Catalogs.

32.0 Robert B. Ruddell, University of California, Berkeley. Early Prediction of Reading Success: Profiles of Good and Poor Readers.

33.1 Michael R. Sampson and Patricia L. Anders, University of Arizona. Comparing Estimates of Text Readability: Fry, Cloze, and Teacher Judgment.

33.2 Kathleen Reed, Stonehill College. An Investigation of the Effect of Sustained Silent Reading on Comprehension Skills and Attitude Toward Reading of Urban Secondary School Students.

33.3 Sr. Jean Otto, O.S.F., Oldenburg, Indiana. Reading: Cue Use, Achievement and Comprehension in an Adolescent Population.

33.4 Robert D. Chester and Clifford D. Pennock, University of British Columbia. Coping with Content in Selected High School Textbooks: Influence of Attitude and Achievement.

34.1 Michelle H. Johnston, Michigan State University. Investigations into the Utility of Information Gained from Teacher Diagnostic Techniques.

34.2 Homer Coker and Jeffrey L. Lorentz, West Georgia College. Georgia Assessment of Teacher Effectiveness (GATE) as a predictor of Reading Achievement.

34.3 Martha R. Haggard, Northern Illinois University and Mary Lorton, Aquinas College. Teacher Potential Instrument: Construction, Application and Preliminary Findings.

34.4 Gerald G. Duffy and William Metheny, Michigan State University. The Development and Use of an Instrument to Measure Teacher Beliefs About Reading.

35.1 Lenore Ringler. Teacher Concepts of the Reading Process.

35.2 Margaret Smith-Burke, New York University. Alternative Interpretations of Diagnostic Data.

35.3 Ruth S. Meyers, Brooklyn College, CUNY. Orienting Teachers to an Interactive Model.

36.1 Peter Mosenthal, SUNY, Albany. Paraschematic Variables in Children's Comprehension of Paragraphic Structures.

36.2 Norma Tepaske and P. David Pearson, University of Minnesota. The Effects of Metaphorical Propositions on Children's and Adult's Recall of Prose.

36.3 Margaret W. Cohen and Peter Mosenthal, SUNY, Albany. The Effect of Teacher-Student Interaction on Students' Reading Comprehension.

36.4 Stephen B. Kucer, Indiana University. Cognitive Scripts and Reading Comprehension: Does Less Equal More?

36.5 Diane Lapp and James Flood, Boston University. Differences Between Teacher and Student Decomposition and Recall of the Propositional Structures of Student Texts.
37.4 Richard Allington and Susan Chura, SUNY-Albany,. Effect of Instruction Type on Word Prediction Behaviors of Young Children.
37.2 Martha Wood and Mavis H. Brown, Texas Woman's University. Beginning Readers' Recognition of Taught Words in Various Contextual Settings.
37.3 Jane H. Domaracki, Curtis Clark, Maria Cabiya, and Susan Matzner, SUNY, Albany. The Reading Achievement of Good and Poor Readers Taught by a Code Emphasis Approach.
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38.3 Barak Rosenshine, University of Illinois. Skill Hierarchies and Reading Comprehension.
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50.3 Judith Smith, Montgomery County Public Schools. Purpose and Performance Objectives.

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50.5 Elisabeth Flach, Montgomery County Public Schools. Evaluation.

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60.3 Jane Warren Meeks, Old Dominion University. Effects of Imbedded Aids on Prose Related-Textual Material.
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63.2 Barak Rosenshine. Instructional Principles in Direct Instruction.
63.3 Sigfried Englemann, University of Oregon. Programming Principles in Direct Instruction.
63.4 Jean Osborn, University of Illinois. Implementing the Oregon Direct Instructional Model in Schools.
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64.4 Scott Tucker, University of Missouri-Kansas City. Advancing Formal Symbolic Thought Through Languaging in Mathematics.
64.5 Michael Moninger, University of Missouri-Kansas City. Languaging and General Reading Comprehension.
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65.3 Irene Reiter, Philadelphia Public Schools. School-Based Inservice Programs in Content Area Reading.
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